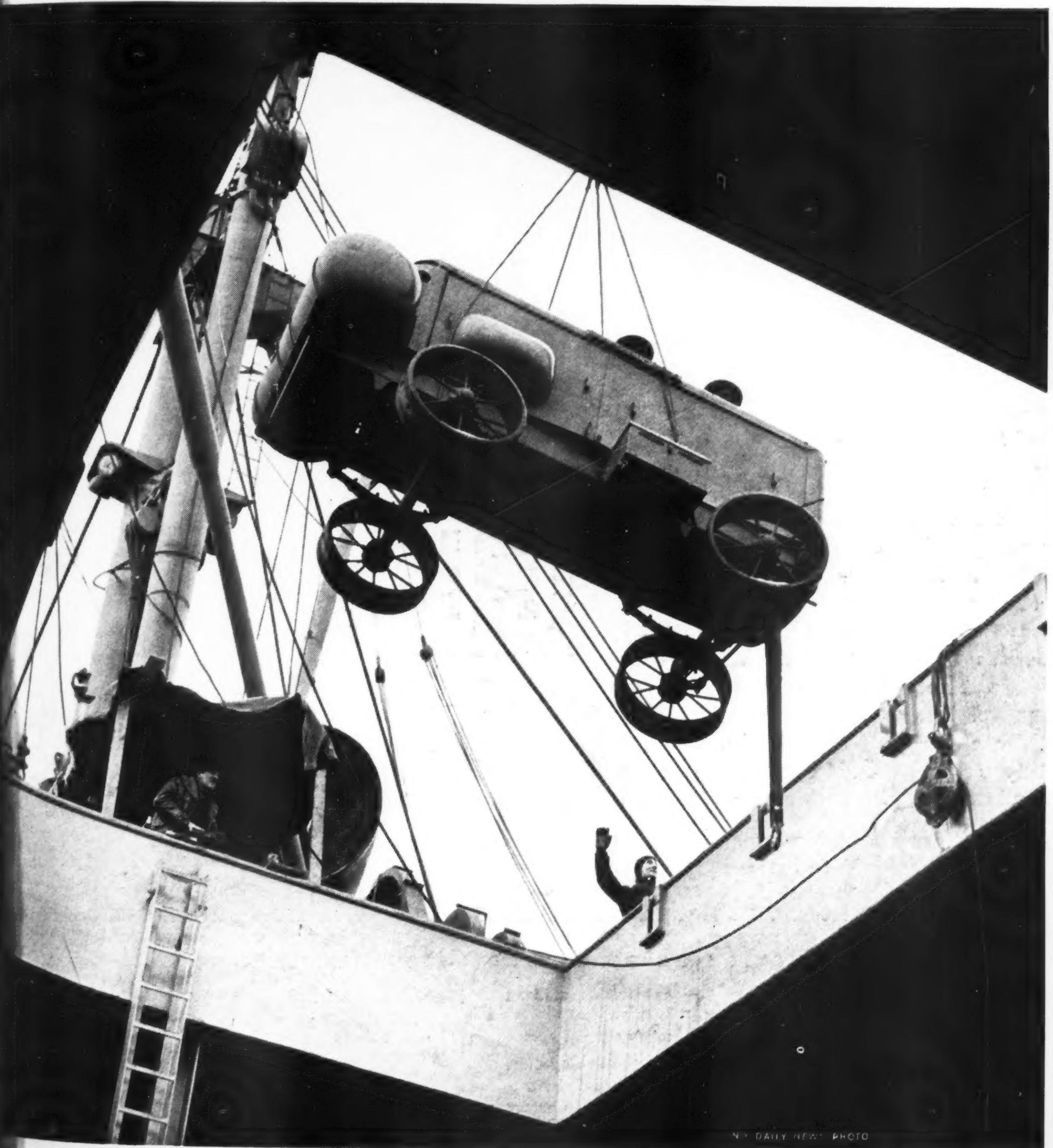
Compressed Air Magazine

APRIL 1943



N.Y. DAILY NEWS PHOTO

AIR COMPRESSOR

Going to war along with beans and tanks.

VOLUME 48 · NUMBER 4

NEW YORK · LONDON

ON THE COVER

OUR cover picture shows a 315-cubic-foot Ingersoll-Rand Mobil-Air compressor being lowered into a ship's hold. Portables were used in World War I, but are playing a much greater part in the present conflict. Today the importance of these machines and the air tools operated by them is emphasized by the thousands that are being shipped to fighting fronts the world over. They are occupying vital cargo space along with tanks, jeeps, gasoline tank trucks, food supplies, etc. Some of them will be run by our own U. S. Corps of Engineers, others by the armies of the United Nations.

•

IN THIS ISSUE

LIKE gold, iron is where you find it. In Canada, outcroppings of high-grade iron ore were discovered on a lake bed. To mine the ore it will be necessary to drain the lake. The importance of this project is discussed in the article called *Iron from a Lake Bed.*

•

PLANNING a Victory Garden? If so, insect pests will be one of your major concerns. But your potential worries have been greatly reduced by the zealous efforts of the Plant Quarantine Inspection, a division of the U. S. Department of Agriculture. Our leading article describes how this organization works.

•

THE Indians have a word for it; and whether or not they can spell "dehydration," they know what it means. In fact, for many years they have been preserving foods by their own methods of drying. One of our southwestern friends tells you about it in this issue.

•

NOWADAYS it is doubly important that compressor performance be kept at its peak. Careful maintenance is one of the things that contribute to smooth, efficient operation. We believe that you will find some valuable suggestions in Mr. Gibbs' contribution, *Wartime Compressor Maintenance.*

•

IN AN article on page 7012, Arthur Wolff tells how trapunto work—padding needlework with cotton thread—is done with compressed air.

•

EVERY man-hour saved is a blow at the Axis. A few time- and labor-saving suggestions are contained in the article beginning on page 7014.

Compressed Air Magazine

VOLUME 48 **April, 1943** NUMBER 4

C. H. VIVIAN, *Editor*
A. M. HOFFMANN, *Assistant Editor*
J. F. KENNEY, *Business Manager*
J. W. YOUNG, *Director of Advertising*
W. M. HACKENBURG, *Advertising Manager*
D. Y. MARSHALL, *Europe*, 243 Upper Thames St., London, E.C.4.
F. A. McLEAN, *Canada*, New Birks Building, Montreal, Quebec.

EDITORIAL CONTENTS

ADVERTISING INDEX

A monthly publication devoted to the many fields of endeavor in which compressed air serves useful purposes. Founded in 1896.

CCA Member Controlled Circulation Audit.

Published by Compressed Air Magazine Co., G. W. MORRISON, *President*; J. F. KENNEY, *Vice-President*; F. E. KUTZ, *Secretary-Treasurer*.
Business, editorial, and publication offices, Phillipsburg, N. J.
Advertising Office, 11 Broadway, New York, N. Y., L. H. GEYER, representative.
Annual subscription: U.S., $3.00; foreign, $3.50. Single copies, 35 cents.
COMPRESSED AIR MAGAZINE is on file in many libraries and is indexed in Industrial Arts Index.

QUARANTINE HEADQUARTERS
The fine structure in Hoboken, N. J., that is our front-line defense against foreign plant pests and diseases.

Our Battle Front at Hoboken

R. G. Skerrett

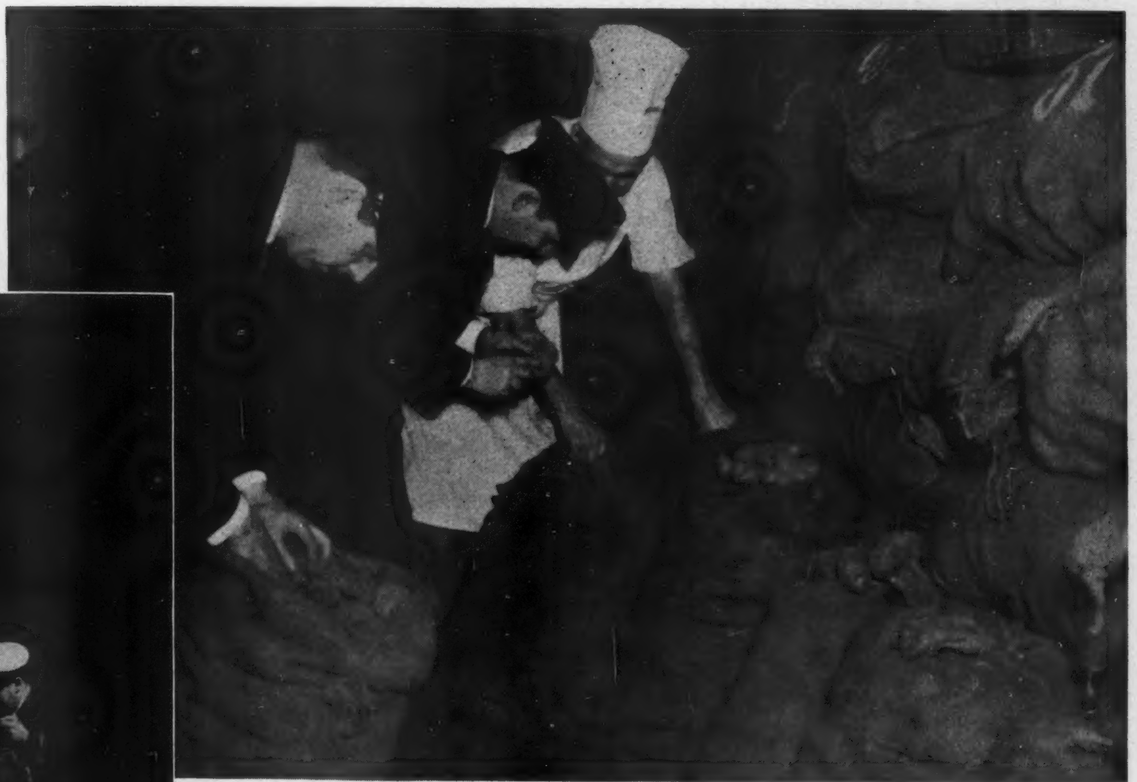
HECTIC preparations for the planting of Victory Gardens throughout the length and breadth of the land are the best evidence of how aroused we are over the possibility of a shortage of foodstuffs in America. The situation has brought home to us anew the vital part vegetal life and the cultivation of the soil play in our daily lives the year round.

The need of keeping up our strength so that we can better back our fighting men on distant battle fronts and supply them with sustaining foodstuffs has brought to light another battle front here at home—one not merely for the duration of the present war but for so long as we count upon surviving as the greatest of democracies. We refer to our battle front at Hoboken, N. J., which has been created to keep out of the country any and all alien insect pests that may be a menace to the nation's plant life.

It may be recalled that during World War I the Government maintained at Hoboken its port of embarkation from which thousands of our soldiers sailed away to halt the foe on the other side of the Atlantic. Today, on the same reservation close to the Hudson River, the U. S. Department of Agriculture has an established base, but this time for the immediate defense of our land—for disposing of enemy aliens in the form of plant pests. There can be no compromising with these intruders, for far too much may be at stake if they slip by.

INSPECTION ROOM
Experts at the Hoboken quarantine base examining newly arrived orchids and their packing materials. Great care is taken not to injure these and other valuable tropical plants in ridding them of insects and diseases. All those that are given a clean bill of health are repacked for shipment to their assigned destinations. The entomologist at the left is using a binocular loupe to inspect a plant while the one at the top is looking through a binocular microscope.

The Plant Quarantine Inspection House, as it is called, is a bottleneck, and an intentional one, for through it must pass all imported plants and certain classes of bulbs, seeds, and associated shipments of propagating materials that may be suspected of harboring insect life and plant diseases in any stage of development which, if admitted, might later prey upon our crops, gardens, orchards, forests, and even the wide ranges on which our herds and flocks graze. Bitter experience and staggering economic sacrifices have em-



U.S.D.A. photo by Rothstein

Resettlement Administration photo by Rothstein

PLANT-QUARANTINE INSPECTORS ON THE JOB

The picture at the left shows a plane that has just arrived from Bermuda, and among the first to board her are the men whose duty it is to keep alien insect pests and diseases from reaching our shores. In the view above, ship's stores are in the line-up. Examiners are scrutinizing bags of potatoes on a passenger vessel arriving at a United States port from abroad.

phasized the prices that have been paid in the past for neglect and which, but for continual vigilance, might levy even greater tolls upon our agricultural wealth.

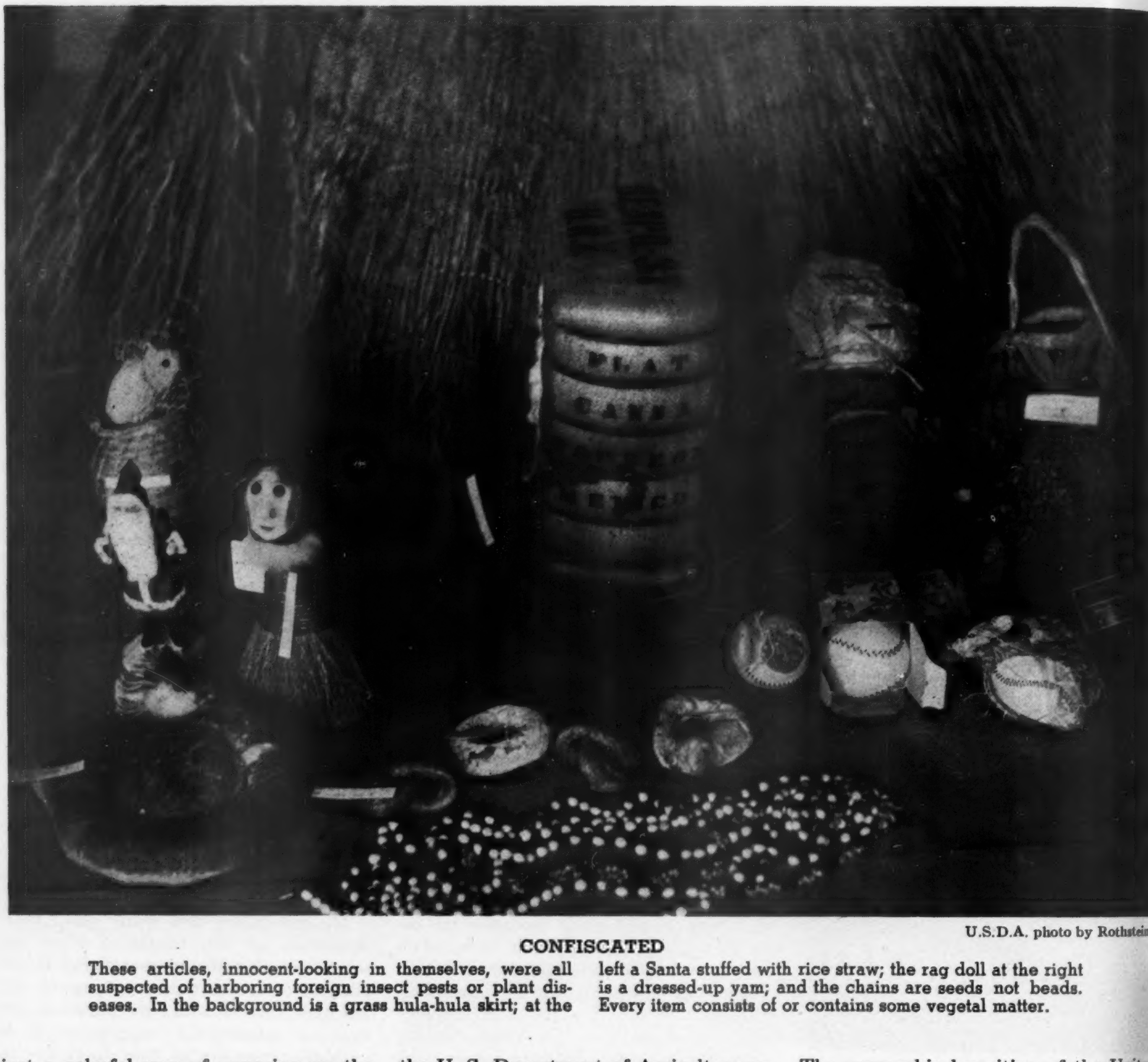
The Hessian fly is the often-cited dreadful example of what ignorance and neglect may cost if the menace lurking in such a tiny creature is not dealt with promptly. That insect reached America when our forefathers were fighting for national independence during the Revolutionary War. The straw was imported as bedding for the German mercenaries who were hired to help defeat the colonists and carried stages of the pest that not only found a congenial home here but multiplied and spread far and wide. According to our entomologists, Hessian flies in our own time have destroyed in the course of a single year wheat to the value of $100,000,000.

Subsequently, many other plant pests reached this country from foreign sources; but despite the injuries caused by them and the repeated warnings of our entomologists, little of moment was done by the constituted authorities to protect us from recurrent incursions. Virtually no organized efforts to keep out these alien insects were made prior to 1912, when the Plant Quarantine Act was passed by Congress. Since then, the U. S. Department of Agriculture has been battling valiantly with this problem along two definite lines. First, to prevent admission of plant pests from other lands; and, second, to develop ways and means to check and, where possible, to exterminate those that have entrenched themselves here and are doing damage to our agriculture. This article deals only with the work of exclusion as typified by the activities of the Plant Quarantine Inspection House.

The Hoboken establishment was built and equipped to serve the Port of New York, where normally arrives 85 per cent of the imports that may require plant inspection and treatment. In military operations, each contending general strives to have at his disposal an immediate force at least the equal of that of his foe. In the fight against alien insects and plant diseases, this ratio is not possible. Even so, the defensive instrumentalities—the experts and their equipment—of the Plant Quarantine Inspection House are the largest and finest of their kind provided anywhere. Some facts about what the corps of entomologists and plant pathologists at this institution have to combat will enable us better to evaluate their responsibilities.

No one knows how many plant pests flourished on this continent when the white man first landed here, nor can anybody be certain as to how others that did not exist here at that time were brought over by subsequent voyagers. It is authoritatively stated that there are in this world more than 700,000 described and named insects, and every now and then others are discovered. A few years ago Lee A. Strong, chief of the Bureau of Entomology and Plant Quarantine of the Department of Agriculture, stated that 75,000 kinds have been reported on this continent north of the Mexican border. Of that number it was estimated that no fewer than 6,500 were so injurious to agriculture in the United States that they were regularly listed in every periodic insect-pest survey. But that is only a part of the record.

It seems that there are known to be as many as 20,000 classified insects, many with harmful capacities, that have not yet gained admission within our boundaries. E. R. Sasscer, chief of the Division of Foreign Plant Quarantine of the Bureau of Entomology and Plant Quarantine, declared not long ago that many of these "are knocking daily at our doors, eager to gain entrance." While this is



U.S.D.A. photo by Rothstein

CONFISCATED

These articles, innocent-looking in themselves, were all suspected of harboring foreign insect pests or plant diseases. In the background is a grass hula-hula skirt; at the left a Santa stuffed with rice straw; the rag doll at the right is a dressed-up yam; and the chains are seeds not beads. Every item consists of or contains some vegetal matter.

just a colorful way of summing up the situation, the grim fact remains that the inadvertant entrance of one or even a few of them might entail economic losses amounting to many millions of dollars in the course of a year. The present global war has brought about conditions that increase that menace and impose ceaseless watchfulness.

The estimated damage caused by insects in this country annually is equivalent to a loss of $1,601,527,000, and that figure would approximate $3,000,000,000 if we included the cost of maintaining Federal and state research bureaus, experiment stations, quarantine organizations, and the control outlays assumed by farmers, orchardists, etc. It is believed by qualified experts that fully half of the pests responsible for the foregoing losses were originally of alien origin. Now for a few of the destructive immigrants.

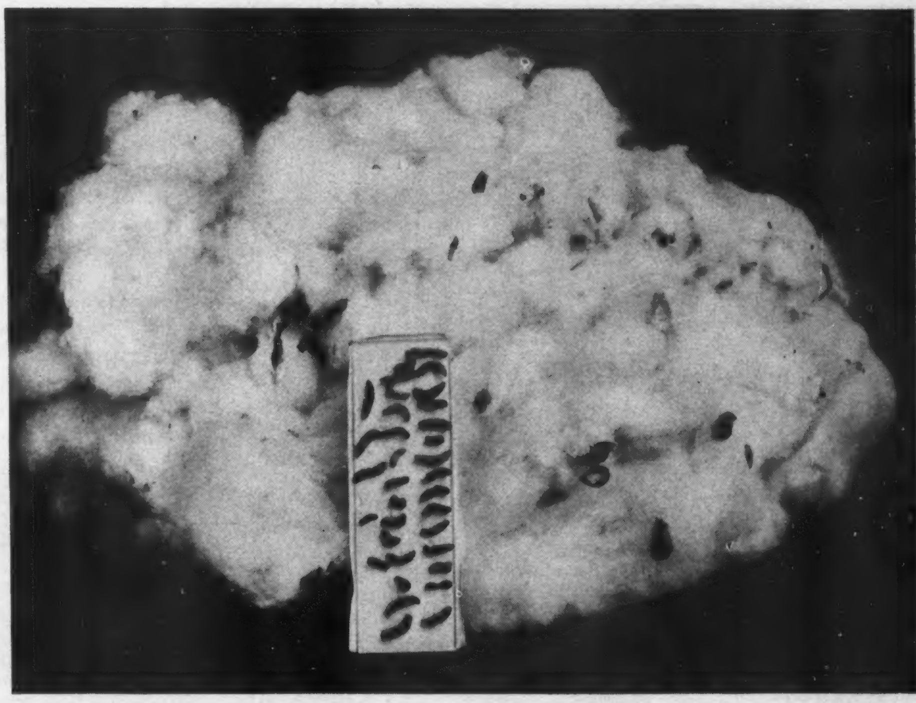
The codling moth, which attacks apples and pears, levies a toll yearly of some $17,500,000. About twenty years ago, the U. S. Department of Agriculture recorded that the boll weevil was then destroying each twelvemonth $300,000,000 worth of cotton, and in 1938 the sugar-cane borer caused planters in Louisiana a loss amounting to $4,700,000. In the same state the mosaic disease nearly wiped out the sugar-cane industry a few years back. Between 1920 and 1939 bark beetles killed 15,000,000,000 board feet of pine in the forests of Oregon and Washington alone, as compared with less than 1,000,000,000 feet destroyed by fire and wind in the same interval. The list of these plant pests and diseases, none of which is native to this country, might be greatly extended, but the lesson pointed should suffice.

"America is the home of insects." So one of our eminent entomologists has stated. It would be more exact to say that America offers a happy hunting ground for many that have come to us from their less favorable original habitats in foreign lands. This is not hard to understand. The geographical position of the United States is such that it has a wide range of climatic conditions, it has a great diversity of soils, and its many varieties of vegetal life offer inviting environments to all sorts of alien insects. Some of these intruders have, in fact, thrived here as they never did in their previous settings.

The Asiatic chestnut blight, which has well-nigh doomed all our native chestnut trees, is not destructively the same pest in the Orient, its home, as it has become here. The Japanese beetle—familiar to thousands of us—is one of our most recent unwelcome arrivals, and it is not only more numerous and more harmful here than it is in similarly infested areas in Japan but it seems to enjoy life here more than it does in the Far East. Why this is so is a story too long to tell now. What is of immediate concern is that grubs of the Japanese beetle reached this country about 25 years ago in an innocent-looking consignment of iris from the Orient of which plantings were made in New Jersey.

Since that time the insects have spread northward as far as Maine, southward to SouthCarolina, and westward to Michigan, Illinois, and Missouri. The migration has been in continually widening circles from each newly established focus of infestation, and there is no telling how far this progress will go. Distribution has been promoted more through the channels of commerce than by the flight range of the pest, which is around 5 miles annually. The beetle has its food preferences, as have other insects, and when the enticing plants are available the creatures quickly strip them of their foliage and their blooms.

Means of transportation have long played an important part not only in bringing alien insects and plant diseases to our shores but in aiding them to spread once they were within our gates. In the early days, when ships crossed the oceans infrequently and their voyages were prolonged, the odds were against the survival of plant pests. The situation became more favorable for the stowaways when vessels grew larger and faster and no longer depended upon the wind for propulsion. Still later, the introduction of refrigerated cargo spaces increased the likelihood of undesirable insects making the journey, because the host plants, upon which they depended for their sustenance, remained fresh.



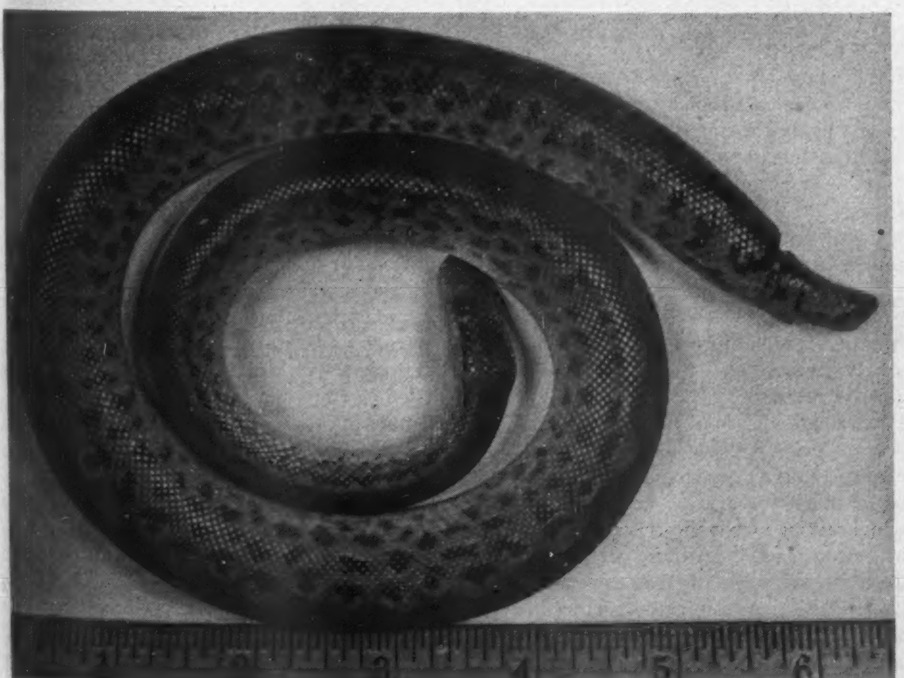
INSECT PEST AND ITS HOST

Here is an 8-ounce sample of raw cotton that was taken from the baggage of a passenger landing from a South American port. It contained as many as 34 live pink-boll-worm larvae!

Aerial transport has again altered conditions and added tremendously to the task laid upon our plant-quarantine organization. The great speed of aircraft has shortened former trips overseas from days to hours and has correspondingly aided the migration of plant pests from country to country. When the dirigible *Graf Zeppelin* made her first transatlantic flight in 1928 our inspectors discovered seven species of insects and two kinds of plant diseases on flowers used in the passengers' quarters for decorative purposes. When the airship made her second visit in August of 1929 they took twenty species of insects—six of which were not known to occur in the United States—from vegetal material carried on board.

Three years ago, 4,968 airplanes from foreign countries arrived at our various ports of entry, and 779 of them had alien pests in their cargoes, travelers' baggage, parcel post, and elsewhere on and in the craft. All told, there were 2,445 interceptions of such undesirable stowaways. During the same year the alert men of the U. S. Department of Agriculture effected 57,561 separate interceptions of alien insects and plant diseases that reached our seaports in some form of host on ocean-going vessels. These figures indicate in a measure the conditions encountered and the vigilance that must be exercised to exclude plant pests coming to our shores in times of peace. The present war has changed the picture and reduced the number of countries from which such troublemakers might arrive, but there are circumstances that have intensified the need for watchfulness.

Horticultural imports still arrive intermittently from the British Isles, as well as from Central and South America. Planes from our southern neighbors land either at Brownsville, Tex., or Miami, Fla., and inspectors at those airfields carefully examine baggage, parcel post, and spaces within the craft where insects harmful to plant life may be secreted. But moth-like creatures can attach themselves to the external surfaces of a plane and fly away and alight even before it touches the ground. This is one of the risks incident to the newer order of rapid transit and long-distance travel. Not long ago a parcel-post package, opened at one of the airports mentioned, had in it an



INFANT BOA

This member of the snake family hitchhiked from South America to the Port of New York in a crate of orchid plants.

FUMIGATION

Below is one of the six vacuum fumigating chambers which differ in volume to accommodate boxes and crates of varying sizes. The smallest has a capacity of 50 cubic feet and the largest of 1,000 cubic feet, with 100-, 200-, and 400-cubic-foot tanks in between. At the left are the applicators in which the exact dosage of gas required to kill an undesirable insect pest is measured out. Before it reaches the fumigating chamber the liquid is gasified by passing it through a volatilizer.

amaryllis bulb infested with grubs of boring insects of an unfamiliar but manifestly highly destructive kind. Those grubs might have become gravely troublesome had that bulb been planted; but, as it was, they were destroyed at the Hoboken Plant Quarantine Inspection House.

Mail from our fighting men on distant fronts occasionally contains floral sprigs, and these letters have to be examined for plant diseases or pests to prevent their introduction and possible propagation here; and for the same reason it is necessary to scrutinize every ship that comes back from remote sections of the world. It is the unexpected that presents the gravest problem. For instance, a vessel—one of a convoy sent to Iceland—returned without a cargo but carried a sizable load of earth for ballast. Some of that soil was discharged at an Atlantic port, and simply as a matter of routine—not because of any suspicion—experts of the plant quarantine service decided to give the stuff an examination. What was their surprise when they found that the semiarctic earth contained a very destructive variety of root borer—females capable of reproduction without male fertilization—that had so far not gained a foothold here. These insects survive in Iceland under harsh conditions, and it is conceivable that, had they obtained lodgement here in more favorable environments, they might have multiplied and spread rapidly.

The Plant Quarantine Inspection House is a fine 4-story structure that has taken over the work carried on for fully two decades in an outmoded, 1-story building in Washington, D. C. The new quarters are spacious and have ample facilities for dealing effectively and speedily with large and small incoming shipments that might harbor forms of life known to be or likely to become a menace to our agriculture. The equipment includes vacuum fumigation tanks from which the air can be withdrawn and various gases introduced to kill plant insect pests, and there are large tanks in which plants and plant products are treated with hot water to kill insects or microscopic worms, popularly known as eelworms. The water can be regulated within half a degree of Fahrenheit and held at a given temperature as long as required. After bulbs, for example, have been so disinfected they can be shifted to drying cabinets through which air at any desired temperature can be circulated. Among the available facilities are specially constructed chambers where plants may be given a vapor-heat or a dry-heat treatment, but always under accurately controlled conditions.

Shipments delivered at the quarantine station are first sent to one of the inspection rooms, where the trained entomologists and plant pathologists—who are likewise well-informed plantsmen—have to exercise as much judgment as do doctors, interns, technicians, and nurses in a hospital. Not only are they garbed like them but, in discovering and identifying plant pests, they may also have to use a hand lens, a binocular "loupe," or a binocular microscope, depending upon the closeness of the scrutiny and the degree of magnification. Instruments and apparatus are sterilized in autoclaves, and the rooms in which the work is done are tiled so they can be washed and sterilized. Some plants carry diseases that are as contagious as are certain human diseases, and some of the insects are so small that they may readily be carried about unseen upon an inspector's clothing.

For the convenient handling of consignments of different volumes, the establishment contains a battery of six vacuum fumigating tanks ranging in capacity from 50 to 1,000 cubic feet. There are, in addition, four fumigating chambers, each with a capacity of 25 cubic feet, in which seeds are treated at atmospheric pressure for possibly 24 hours. All but the

1,000-cubic-foot tank are double walled or jacketed so that steam can be introduced between the shells for heating. Each is equipped with a steam jet that discharges into the tank chamber, thus converting it into an autoclave for sterilizing packing material, debris, and any soil from around plants that may be suspected of harboring plant pests.

The method of fumigation now practiced is primarily the outcome of work done by Mr. Sasscer in developing the process of "vacuum fumigation" initiated about 26 years ago by the U. S. Department of Agriculture for the immediate purpose of killing pink boll worms in baled cotton. At that time, the pest had reached the Texas fields from its native habitat in neighboring Mexico and threatened to become the most menacing enemy known to the cotton grower. By that method, hydrocyanic-acid gas was forced into the compressed bales to kill the boll worm in any living stage in which it might be lurking there. Further investigations disclosed that considerably higher concentrations of the lethal gas could be secured by introducing the gas in a chamber under a vacuum and holding the material to be disinfected under reduced pressure. At the Plant Quarantine Inspection House the gas is now applied under varying pressures, depending upon the character of the material to be treated and the particular pest to be dealt with in each case.

Most of the plant materials are fumigated with either hydrocyanic-acid or methyl-bromide gas, but carbon disulphide is used for disinfecting seeds. Hydrocyanic-acid gas is lighter than air while methyl-bromide gas is heavier, and either may prove deadly to human beings. Carbon disulphide, however, is less hazardous. The two lethal gases are effective against insects, but their action varies somewhat in its potency, depending upon the pest being treated. The fumigating pressure ranges from that of the atmosphere to a 27-inch vacuum (3-inch pressure) while the time of exposure is usually 90 minutes for hydrocyanic-acid and methyl-bromide gas and 24 hours for carbon disulphide.

The gases, stored in steel cylinders, are received in a liquefied condition and the dosage required is measured in tubular glass gauges known as applicators. With a vacuum induced in a tank, the gas is sucked into it as soon as the outlet valve of the applicator is opened. Between the latter and the tank is a volatilizer, and in passing through this apparatus the liquid is gasified. In the fumigating room, and on the same panel board with the applicators, are vacuum gauges, pressure gauges, and temperature recorders for the different tanks so that the operators are at all times fully informed of every essential working condition.

Before a chamber is opened after it has been in service, the contained gas is withdrawn and sent through a cleaner where the gas is precipitated in the form of a sludge for safe disposal. The air so treated can then be discharged into the atmosphere without risk of doing harm. Even after the fumigating tank has been exhausted of its gas and restored to atmospheric pressure, the disinfected packages or material may give off some gas. When there is any likelihood of the workers being exposed to this hazard, they don gas masks.

So far the processes described have been purely defensive—designed only to kill insects. In cases of plant diseases, fumigation with formaldehyde gas is resorted to occasionally, also dusting with mercurial compounds, or the use of either corrosive-sublimate solutions or hydrogen peroxide may be preferable. Sometimes plants are just sprayed with a fungicide. But whatever is done, the aim is always to save plant shipments of value by making them "clean" and safe for admission into the country. The immediate purpose, of course, is to deal promptly with every package and consignment received at the Plant Quarantine Inspection House. Usually, detection is relatively simple; but from time to time the staff is confronted with unknown insects or evidences of plant diseases. Whenever that is the case the specimens are carefully isolated and dispatched to the U. S. Department of Agriculture in Washington for deliberate and maybe prolonged study.

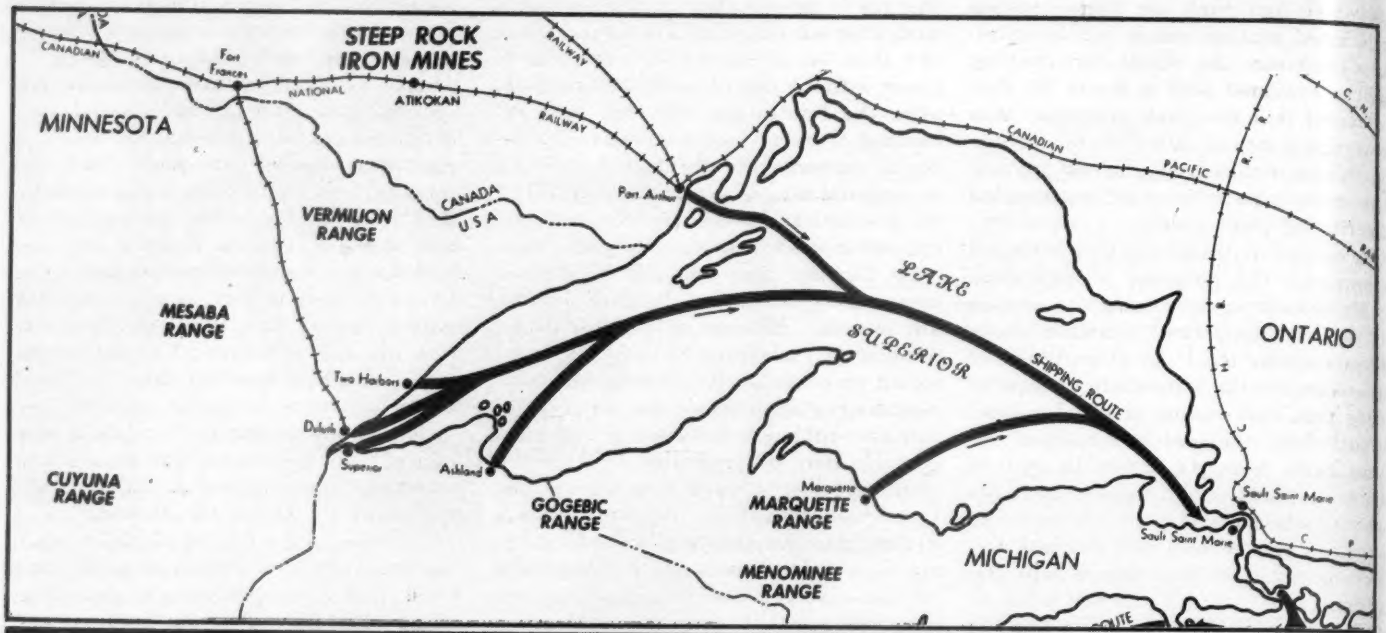
However, our battle front is not always impenetrable, because there will ever be difficulties in halting strange plant pests that may arrive by unexpected means. For example, although the Department of Agriculture has for years maintained a quarantine against elm plants and the living parts of such plants, it was not until the Dutch elm disease became established here that our experts realized that infection could be introduced by elm burls, which are a source of veneer—for that matter by any elm wood to which the bark was still adhering. This wood has, in the past, been used extensively abroad for making barrel hoops for crates for the transportation of china. Too late it was learned that the bark harbors beetles that attack our native elms and related plants and spread the Dutch elm disease.

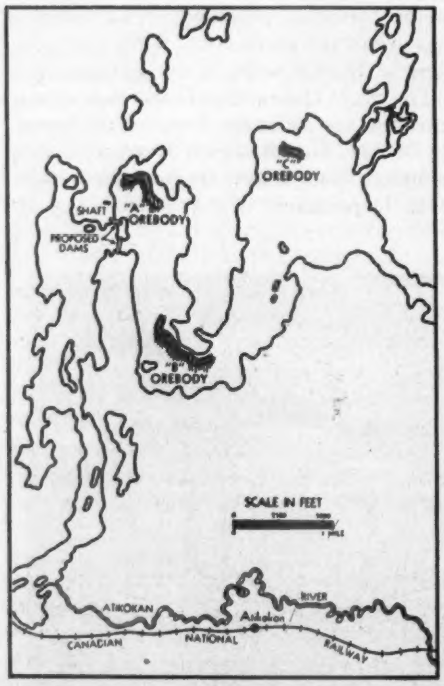
The stimulating fact of all this is that our farms and our Victory Gardens, our forests and our ranges, are now far better safeguarded against incoming plant enemies than they were in the years gone. This phase of national defense, although momentarily of outstanding importance because of the emergency, will always remain of vital concern to the nation.

The Plant Quarantine Inspection House activities are under the direction of George G. Becker, entomologist, Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture.

HEAT-TREATING ROOM

An inspector taking a temperature reading of bulbs undergoing a hot-water treatment to free them of plant enemies. In disinfecting narcissus and certain other bulbs, the water can be raised to 110-120°F. without injuring them. This room is equipped with four hot-water tanks, two autoclaves, and a drying cabinet.





IRON RANGES AND STEEP ROCK LAKE

The map above shows the principal iron-ore deposits of the Lake Superior District from which the United States obtains approximately 75 per cent of her supply of that mineral. Steep Rock Lake is about 50 miles north of the Vermilion Range, and it will be noted that it is almost as favorably situated for lake transportation as our own ore bodies. At the left is a sketch of Steep Rock Lake, showing the location of the three deposits so far discovered in it. These will be made accessible for open-pit mining by diverting the river that feeds the lake, erecting dams to separate the eastern section from the western, and then by pumping the water from the area in which the ore bodies are.

Iron from a Lake Bed

C. H. Vivian

PREPARATIONS are being made in Canada to drain a sizable lake to gain access to high-grade iron ores that outcrop on the lake bed. The undertaking has the endorsement and financial backing of both the Canadian and United States governments. The ore is especially desired at this time because it is suitable for use in open-hearth steel furnaces and will reduce the amount of scrap steel that is now added to each charge and that is growing scarcer month by month.

The property is owned by Steep Rock Iron Mines Limited, and consists of 7,000 acres covering all of Steep Rock Lake and some adjoining land. The lake is in the Province of Ontario, about 40 miles north of the international border, and 3½ miles from Atikokan, a division point on the Canadian National Railways. The latter connects with Port Arthur, 142 miles to the east on Lake Superior, where facilities will be provided for loading the ore into lake vessels for transport to steel-making centers in the United States and Canada. Steep Rock Lake is 75 miles north of the famed Mesabi iron range and only 50 miles north of the Vermilion iron range.

As an accompanying map shows, Steep Rock Lake is very irregular in shape. The ore bodies that have so far been located there are in the eastern arm, which will be segregated from the remainder of the lake by two small dams. First, however, the Seine River, which flows into the lake, will be diverted so that it will by-pass the eastern section. Once this is done and the dams have been built, the work of unwatering the lake will be commenced. It is estimated, as a result of soundings, that the lake contains 120,094,000,000 gallons of water, but that ore production can begin when about two-thirds of it has been pumped out. Engineers say that neither this operation nor the construction of the dams presents any great problem. Ten months has been set as the time required to divert the river. After that, with the pumping facilities it is proposed to set up, an additional ten months will be needed to lower the water sufficiently to permit starting open-pit mining operations in the largest of the known ore bodies. Under that schedule actual production would begin during the 1944 shipping season.

The discovery of the Steep Rock ores is the outcome of a persistent search for iron deposits that has been carried on in central Canada for nearly a century and a half. The first recorded venture in iron-making was an attempt, in 1800, by four men to produce cooking utensils for the settlers of upper Canada. They built a furnace on the Gananoque River, but the ore proved to be so refractory and production costs so high that the undertaking failed. For 80 years thereafter various small deposits were mined from time to time, and while some of those efforts were moderately successful temporarily, none gave rise to sustained activity. To stimulate the industry, the Canadian Government, in 1883, offered a bounty of $1.50 for every ton of pig iron made in the Dominion from domestic ores. Later, in the case of locally produced iron containing ores from the United States and Canada, it was also applied to the proportion of domestic ores used. In 1894, the Ontario Government set up a fund of $125,000 out of which to pay $1 for each

short ton of iron manufactured from local ores. As a result of these efforts, four blast furnaces were erected in the province between 1895 and 1907.

During this same general period were made several important ore discoveries. An Indian, Jim Shogonosh, found magnetite at Sapawe, near Steep Rock Lake, and some ore was produced between 1905 and 1912 in what was called the Atikokan Iron Mine. The Helen at Michipicoten began shipping ore in 1899, a year after the property had been acquired by E. V. Clerque, founder of the present Algoma Steel Corporation. It yielded nearly 3,000,000 tons of hematite that was rich enough not to require concentration, but this particular ore was exhausted by 1918. Other and smaller mines that had been opened were soon depleted, and with the closing of the Magpie Mine in 1921 production of iron ore in Ontario ceased until 1939.

That year, spurred by the passage of an iron-ore bounty act by the Ontario Legislature in 1937, mining operations were begun on the siderite (iron carbonate) deposits that had been topped by the beds of hematite in the Helen Mine. In 1941, Sherritt Gordon Mines Limited and Frobisher Exploration Company combined forces to develop the Josephine and several lesser properties in the Michipicoten area. It is reported that production has been started there and that the output will before long reach 2,000 tons daily. An interesting point in connection with the Helen, Josephine, and Steep Rock deposits is that all of them were found beneath lakes.

The Steep Rock ore bodies were discovered in 1938. The presence of iron at the lake had been indicated by boulders of hematite found on its southern shore, the first of these having been reported to the Canadian Government by Dr. C.B. Dawson in 1897. Eight years later, H. L. Smyth, Harvard University geology professor, made investigations there and predicted the existence of large deposits beneath the lake. But, although many prospectors passed that way, nothing tangible was learned until Julian G. Cross, a geologist of Port Arthur, conducted studies at Steep Rock in 1938 and formulated theories that led to the actual discovery of three deposits. The money to prove Cross's theories was supplied by the late Joseph Errington, D. M. Hergarth, and associates.

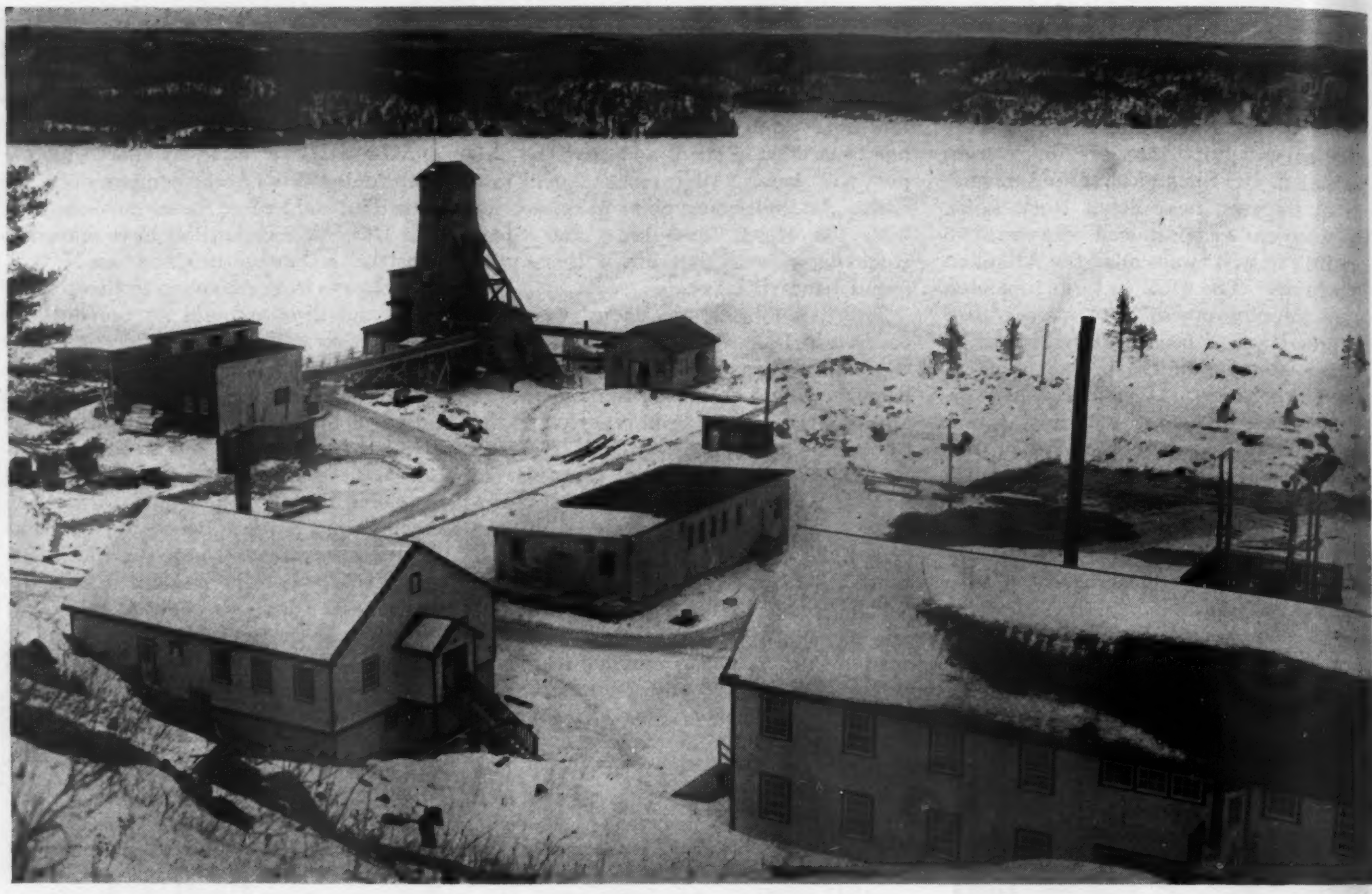
Steerola Exploration Company Limited was formed in 1938 to develop the property, and did some diamond drilling that resulted in the outlining of one deposit and the finding of another. In February of 1939 all assets were purchased by Steep Rock Iron Mines Limited, which continued the drilling program and discovered the third deposit. Much of this drilling was done through ice in the winter season. The owners also took steps towards starting underground mining, which included the sinking of an 800-foot shaft on the northern shore of the lake and adjacent to one of the ore bodies, together with the erection of modern shops, living quarters, and other surface buildings.

The current movement to drain the lake to permit large-scale open-pit production within a relatively short time is a joint undertaking of the company and the Canadian and United States governments. The Dominion authorities have agreed to construct a spur on the Canadian National Railways from Atikokan to Steep Rock Lake and also to build an ore dock at Port Arthur. The Hydro-Electric Power Commission, which is an agency of the Province of Ontario, has consented to run a power line from Port Arthur to the Steep Rock property and to furnish current at a stipulated rate. The diversion of the Seine River will put out of operation a generating station owned by the Seine River Improvement Company, and 10,500 hp. of energy is to be brought in over the transmission line to replace that loss. These commitments by the Dominion and Ontario governments aggregate initial expenditures of $5,000,000, which has already been appropriated. The funds required by the company to bring the property into production are being provided from two sources. The Reconstruction Finance Corporation, in Washington, D. C., has agreed to lend Steep Rock Iron Mines Limited $5,000,000, and the company will raise an additional $2,250,000 by issuing debentures for sale to private investors.

As a preliminary to the making of these financial arrangements, an accredited firm of independent mining engineers and geologists was retained to make an examination of the property and to report upon the amount and character of the ore. This concern, Roberts & Crago, of Duluth, Minn., has estimated that there are 25,060,473 gross tons (2,240-pound ton)

MINING CREWS

These views were taken during the shaft-sinking operations that preceded the plans to gain direct access to the ore bodies by draining the lake. At the right is a group of drill runners with four DA-35 sinkers. In the other picture is shown a bucket of sharpened drill steel.



PRESENT PLANT

The headframe of the mine and accessory surface buildings, with the lake in the background. A shaft and crosscut extending from the water bed to the "A" ore body are available for use whenever it is desired to do underground mining. The lowest level at which this deposit has so far been cut is 1,035 feet below the lake bottom.

of high-grade iron ore in the upper parts of the two deposits designated as Zones "A" and "B," which have already been tested by extensive drilling. Of this total they classify 10,682,764 tons as "proven" ore and 14,377,709 gross tons as "probable" ore. The third deposit, designated as Zone "C," has not as yet been explored enough to estimate its contents, nor have drilling operations been conducted elsewhere on the property where geological conditions indicate the existence of ore bodies. Summing up its possibilities, the company ultimately expects to mine many times the estimated 25,000,000 tons of ore.

Three different drilling methods were used to determine the location and extent of the known deposits. The initial work was in the nature of fast reconnaissance exploration by what has been termed scout-drilling. For this purpose, diamond drills were set up on the ice and casing was carried through the water and soft bottom material to sound rock. The drills penetrated the rock and ore only a short distance, averaging 15 feet. Approximately 250 holes were put down. By means of these it was determined that Zone "A" has a surface length of 3,170 feet and a width of from 175 to 200 feet. Zone "B" was similarly shown to have surface dimensions of 4,750x110 feet. Subsequent drilling proved the latter to have a width of about 150 feet throughout a length of 2,200 feet. However, there is reason to believe that both deposits may ultimately be found to be both longer and wider than preliminary measurements indicate them to be. Only six holes were drilled in so-called Zone "C," no further exploration being attempted because the lake bed in this area is 400 feet beneath the water surface. Consequently, no estimate has been made of the extent of this ore body.

Following scout-drilling, deep diamond-drill holes were put down to test the vertical thickness of the deposits. Most of these were drilled from the shore and were inclined, but some of them were started 700 feet below the lake surface in a crosscut driven from the shaft adjacent to Zone "A." These holes proved the existence of ore in the "A" deposit at a level 1,035 feet below the lake bottom and in deposit "B" at a point 550 feet beneath the lake bed. These depths do not indicate the bottoms of the ore bodies, but are merely the lowest levels at which they have so far been cut. Finally, to determine the extent and character of the ore in more detail, 42 churn-drill holes were put down—38 in the "B" zone and four in the "A" zone. These were cased, and the ore was sampled every 5 feet. The samples were analyzed and used as a basis for estimating the grade of ore available. Further churn drilling to outline open-pit areas on the "B" ore body has been done this winter with good results.

The ore is hematite and in the dry state averages an iron content of 60.8 per cent, while the natural ore, including moisture, is expected to carry 56.5 per cent, as compared with an average of about 52 per cent for the standard ores now being shipped from the Lake Superior region of the United States. Examination of the drilling samples and of the boulders of float ore discovered on the lake shore indicates a grade of ore of exceptionally high uniformity, which promises to reduce the task of grading during mining operations. It is also claimed to have other advantageous characteristics that are probably not found in any other large iron-ore deposit in North America. It is extraordinarily low in silica content, averaging only 3.37 per cent. This is very desirable. As ore containing more than 8 per cent silica is not acceptable for blast-furnace use—those of higher content are penalized in price, increasing difficulty is being experienced by the Lake Superior mines in providing ore that meets this specification, and it is customary to mix low-silica with high-silica ores to bring the silica content of the latter down to 8 per cent. It is because of this that Steep Rock ores

WINTER HAULAGE

A tractor and a sled load of wood nearing the mine property. Exploratory drilling of the ore bodies was done during the winter months with rigs set up on the ice. Approximately 250 holes were put down in the lake bed.

will be valuable for mixing purposes.

Steep Rock hematite is, in addition, unusually low in phosphorus, averaging only 0.017 per cent. Its content of that impurity is therefore far below the permissible maximum (0.045 per cent) to classify it as Bessemer ore. Here, again, it will be desirable for mixing with higher-content phosphorus ores to obtain a Bessemer-grade end product. There are indications that at least 25 per cent of the ore will be lump. This fact, coupled with other favorable physical characteristics and its satisfactory chemical composition, shows that it will be suitable for both blast-furnace and open-hearth use. Actual experiments conducted by the Battelle Memorial Institute of Industrial Research and in an open-hearth furnace of the Republic Steel Corporation bear out these predictions.

The ore tested in the Battelle laboratories analyzed, dry, 62.17 per cent iron, 0.29 per cent phosphorus, and 1.29 per cent silica and was structurally hard and crystalline, with numerous vugs or cavities. The presence of the latter openings enables heat readily to enter the ore, with the result that less is required for its reduction than for most hard ores. In fact, it has been proved that the Steep Rock ore reaches a temperature of 1,900°F. in one-third the time it takes to bring a typical Mesabi Range ore to that point.

The open-hearth experiments were especially illuminating. Ordinarily, when scrap is plentiful, it is customary to use half pig iron and half scrap. A certain amount of hard lump ore is added to the melt to hasten oxidation of the impurities. In recent months, because of the scarcity of scrap, the average charge has consisted of 55 per cent pig iron and 45 per cent scrap. In the Steep Rock tests it was possible to use 72 per cent pig iron and only 28 per cent scrap. The quality of the steel produced was satisfactory, and the elapsed time for the heat was 8 hours and 35 minutes, as compared with a recent month's average of 10 hours and 17 minutes for the same furnace using other ore. On this basis, it is indicated that the steel industry, if it had 2,000,000 tons of Steep Rock ore available annually, could substitute more than 9,000,000 tons of pig iron for the same quantity of scrap now required. In view of the current shortage of scrap, this is significant. The supply of lump ore satisfactory for open-hearth furnaces does not begin to be adequate at the present time. It is estimated that 15,000,000 tons could be used in 1943, but that only a fraction of that amount is available. To make up the shortage, it is the practice to produce nodules from fine ore by a process of agglomeration such as sintering.

The finding of the Steep Rock ores is considered especially fortunate now because of the threatened depletion of the high-grade ores of the Lake Superior ranges. In a report tendered to the War Production Board last May, E. W. Davis, director of the Mines Experiment Station at the University of Minnesota, expressed the opinion that the better grade of material from these fabulous deposits will be exhausted in about eight more years if the current rate of output is maintained. Already there is such dilution that the iron content of the ores shipped has been declining steadily for some years. There are still in the ground enormous quantities of lower-grade ore that can be enriched by concentrating processes, but many months and untold sums of money would be required to set up the necessary facilities. Since the building of plants for this purpose would call for large amounts of steel and other vital materials, there is no possibility of undertaking the work under current conditions.

The diversion of the Seine River and the draining of Steep Rock Lake will be interesting engineering projects although, as previously stated, they are viewed, save for their magnitude, more or less as run-of-the-mill jobs. In diverting the river, it is planned to take advantage of the presence of several small lakes. By incorporating these in the line of the projected canal, the construction cost can be reduced. Similarly, in damming the eastern section of the lake, a site has been selected at a point where an island occupies a considerable portion of the width of that body of water. By building two short dams from the north and south sides of this island to the adjacent shores, the division of the lake can be readily accomplished. The dams will be erected as soon as the river has been diverted, and pumps will be set up so that unwatering can begin immediately following. Preliminary work such as the construction of roads to give access to the area through which the river will be shifted is already underway.

Detailed studies for the unwatering of the lake have been made and it is indicated that fourteen 24-inch pumps, each driven by a 500-hp. motor, will probably be utilized. No great inflow of water is expected after the lake has been drained, although it is natural that there will be some surface seepage into the depression, as is the case in all large open-pit operations. Small dams, ditches, etc., will be built to control this inflow as much as possible.

The "B" ore body is to be developed first because it outcrops on an average 150 feet below the lake surface, as against an average of 300 feet for Zone "A," and is also closest to the present railroad line. It was the intention initially to provide a plant and equipment capable of producing 1,000,000 tons a year, but in view of the urgent need for the ore it is now planned to increase the capacity to 2,000,000 tons.

Dehydration is Old Stuff

Carey Holbrook

All photos, U.S. Soil Conservation Service

FREAK PLANT?

These are not mittens, they're melons hung up to dry on a dead tree at the Jemez Pueblo in New Mexico. The Indian of the Southwest likes his melons and enjoys them the year round, even though the desiccated product is not as luscious as the fresh fruit.

IT DID not require a war to teach the Indians of the Southwest the value of dehydrating food. Long before Hitler's U-boats made cargo space in ocean-going ships precious, the brown-faced people of Jemez, Zia, Sandia, Santa Ana, Hopi, and other pueblos in New Mexico and Arizona had their own drying system to conserve their food supply and to preserve it for winter use. This system is not new even to the whites. Capt. John Smith and his colonists practiced it along about the time the doughty captain was having that affair with the Indian maiden.

The whites were familiar with dehydration long before the day of pressure cookers, glass jars, and other modern means and methods of canning and preserving fruits and vegetables. Hunters and trappers practiced it so that they could save weight and space and thus carry the food needed on long trips. Which is the identical reason why dehydration is so much in the public eye at present. But the Indians of the Southwest are the boys and girls who have clung to their system through good years and bad, and still use it. Out on their blistering mesas they have raised their scant crops and hoarded them jealously by the only natural means of preservation they knew—drying them in the sun. Dehydration of food to an Indian is old stuff! And one of their principal vegetables in the dried state is chili.

When the Spanish colonists came surging up the Rio Grande late in the sixteenth century they brought with them the seeds of a smoking vegetable that soon became one of the mainstays of the Indians' diet in that drought-ridden land. The ordinary gringo would call the vegetable "red peppers." But to the Indians of the Southwest it is "chili," and in the dry state they use it to season almost everything they cook. So far as fattening units are concerned, chili is a dead loss. Even a radio announcer would have trouble in finding a calorie in a carload. But, just the same, the southwestern Indian would give up his right eye rather than lose his chili crop, and perhaps he is not so far wrong at that, as we shall see.

If we want to run chili right back to its point of origin, we would end up in a South American republic of the same name. The English name of the plant is Capsicum, and the hot part of the pod is a volatile oil similar to turpentine. In recent years health experts have been finding out why the Indians and natives of the Southwest who use chili profusely in their

GOOD CROP

Above is a scene in Cochiti Pueblo in the State of New Mexico. The family and livestock will not have to go hungry during the cold months because there will be plenty of corn, flour, and dried fruits and vegetables in storage. The Indian woman at the right lives in Acomita Pueblo, also in New Mexico. She has a fine stock of tangy red peppers drying against an adobe wall where the full force of the sun can reach them. She probably does not know it, but dehydrated chili is one of the richest sources of vitamins A and C.

diet rarely suffer from sinus trouble or colds, are not troubled with constipation, and seem to store up more energy than one would expect from the food they eat. They have learned, in explanation of this, that native chili is rich in vitamins A and C. In fact chili, according to nutritionists and dieticians, is the highest known source of vitamin C, overshadowing the tomato and orange.

Uncle Sam's efforts in behalf of the forgotten man led directly to the Government's discovery of the value of chili. Federal agencies, in endeavoring to establish a balanced diet for the native people of the Southwest, frowned upon the mixture of chili and beans and tortillas. This mess was all right occasionally, but it certainly wasn't the Easterner's idea of a balanced diet. School children were given standard lunches to take the place of their chili and beans. All should have improved with this scientific feeding, but something went wrong. The Indians did not do so well on this new and strange food. Concrete evidence of this was brought out in the schools where children were given the balanced lunches. The kids got the sniffles! Colds were frequent and hung on. The boys and girls lost their pep. But when chili was restored, then red cheeks, health, and energy returned to them.

For many years doctors have known that the native of the Southwest seldom if ever suffers from high blood pressure and kindred ailments. This has been traced directly to the lowly bowl of chili, which is also playing an important part in helping condition some of our fighters to win the war. Individual soldiers coming to the Southwest attest to the healthful properties of chili. It is no military secret that Uncle Sam's boys are inhaling, both on and off their posts, thousands of gallons of *chili con carne* and *chili con carne y frijoles*, and from this they not only derive a lot of satisfaction but also store up energy and protection from disease.

Another ingredient found in chili is an oil that medical research men have called O.R.C. oil. It is said to have highly antiseptic qualities that make it most beneficial for colds, tonsilitis, catarrh, and kindred ills. Of course the pueblo Indian does not know he is getting all these benefits when he eats chili. All he knows is that his chili crop is a thing to be tended with loving care until at last he hangs it up on the side of his house to dry. The squaw throws a dash of chili into almost everything she cooks, but always does she use it in the preparation of *chili con carne y frijoles*, which means chili with meat and beans.

In making *chili con carne* the Indian uses fresh meat when she can get it, and when she can't she uses jerky, which brings us to another piece of dehydration practiced by the southwestern Indian. Jerky, or jerked beef, is simply beef cut into thin slices and hung in the sun to dry. It gets black and hard and tough, but retains its calories and can be kept for long periods without spoiling. It takes up much less space in a saddle bag, and is not so heavy as fresh beef. When the redskin of an early day went on a journey, he took along a bundle of jerked beef to sustain him. He could either cook it in some manner or eat it raw while he was jogging along on his horse. White trappers and hunters also learned its value and used it to a considerable extent. Indians of the Southwest still jerk their beef and carry it with them on their journeys; but we would like to go on record that beef preserved in this manner is none too appetizing even when mixed with chili and beans.

To start with, jerky is very liable to contain a liberal sprinkling of grit, running all the way from fine sand to chunks of gravel big enough to crack a tooth. When the wind decides to blow in the Southwest it takes more than a fresh mess of jerked beef on the line to stop it. And a pueblo Indian squaw is not going to keep running outdoors to take her jerky off the line just because a sandstorm is howling around the patio. So *chili con carne* made of jerked beef is apt to be full of dirt, along with the vitamins, and a white man has to have a good stomach to get it down and keep it there long enough for the vitamins to begin to take hold.

The actual mechanical process of preparing jerky is not very complicated. However, it should be borne in mind that

it is practical only in states like New Mexico and Arizona, or where the climate is arid enough to permit drying before the meat has time to spoil. If a jerky maker wants to take the round-about method, he will first cut the beef into chunks, following along the muscles, and then slice those chunks into pieces about a quarter of an inch thick. Then he'll salt them lightly and roll the strips together, letting them stand until the juices begin to come out. Next he puts 2 pounds of salt into a gallon of boiling water, and while this mixture is still boiling he dips the strips into it for a few seconds, or until the surfaces have become slightly seared. That done, they are hung up like clothes over a heavy cotton rope or wire or a wooden frame to dry in the sun. Every part of the meat is exposed to the air as much as possible to prevent molding, and chili powder or black pepper may be added to keep the flies away.

The Indian, however, gets the job done a lot quicker, and probably just as efficiently by simply cutting the beef into thin strips, salting it thoroughly, and hanging it up. If a few flies happen to want a meal off of it, it doesn't make a great deal of difference to him, because

LAYING UP STORES FOR THE WINTER

The upper picture shows a Hopi Indian at Hotevilla, Ariz., carefully spreading peaches on stones to dry. In the background the pueblo sleeps, for it is midday and the sun is hot. The fruit is halved and pitted for the purpose, but not peeled. Apples to be dehydrated are pared, sliced, and strung on a line like beads, while plums are dried whole.

NOT WASH ON THE LINE

With a lot of jerked beef hung up to dry for storage, Indians on the Navajo Reservation in northwestern New Mexico do not have to worry about meat coupons in ration books. They may run across a little gravel when eating it, but that is nothing unusual and no cause for comment. The Indian keeps his jerky in a well-ventilated box.

jerky is generally washed well before it is eaten. Only a few days are required to produce the finished product, which is then stored in a ventilated box until it is wanted.

If the Indian is partial to chili as a food that will stick to his ribs, he is likewise sold solid on the value of a melon as the tastiest piece of provender that springs from the ground. To an Indian, a melon does not mean that highly developed and tenderly reared thing called a cantaloupe. His melon is one of those pumpkinlike varieties known to earlier-day farmer boys as a "mush melon." It may be round and it may be long and undoubtedly is some kin to a gourd. But the Indian dotes on it, no matter what its shape. He treasures the seed tenderly from year to year and plants his bit of ground where he can look after it day and night.

Even the Navajos, who have no settled villages but roam from place to place with their sheep, usually manage to hang around in one locality long enough in the summertime to raise melons. And if you happen to be driving across their windblown reservation during that season of the year you are apt to see a thin patch of vegetation in the bottom of a depression. If you will investigate that scrawny crop you will more than likely find melon vines among the greenery. Not only does the Indian eat his melons as they ripen, but his squaw also dries them for winter use. Dehydrated, they are a long way from the soul-satisfying product taken direct from the vine; but they are a lot better than no melons at all, as the Indian knows well.

As a raiser of fruit, the southwestern Indian is practically a washout. Only the land that is under irrigation is suitable for fruit growing, but the Indians do not go in for it even in those favored areas. Wild plums flourish in some places, and wild strawberries and raspberries are found in isolated mountain canyons. But the fruit picked and dried by the Indians consists mainly of scrubby seedling peaches, apricots, and apples. Even though these are scrawny, and certainly not suitable for exhibition at the state fair, they are swell eating when the snow is swirling around the pueblos. So Mrs. Squaw gathers in what she can find, prepares it without too much fuss, and spreads it out where Old Sol soon transforms it into dehydrated food "a la Indio."

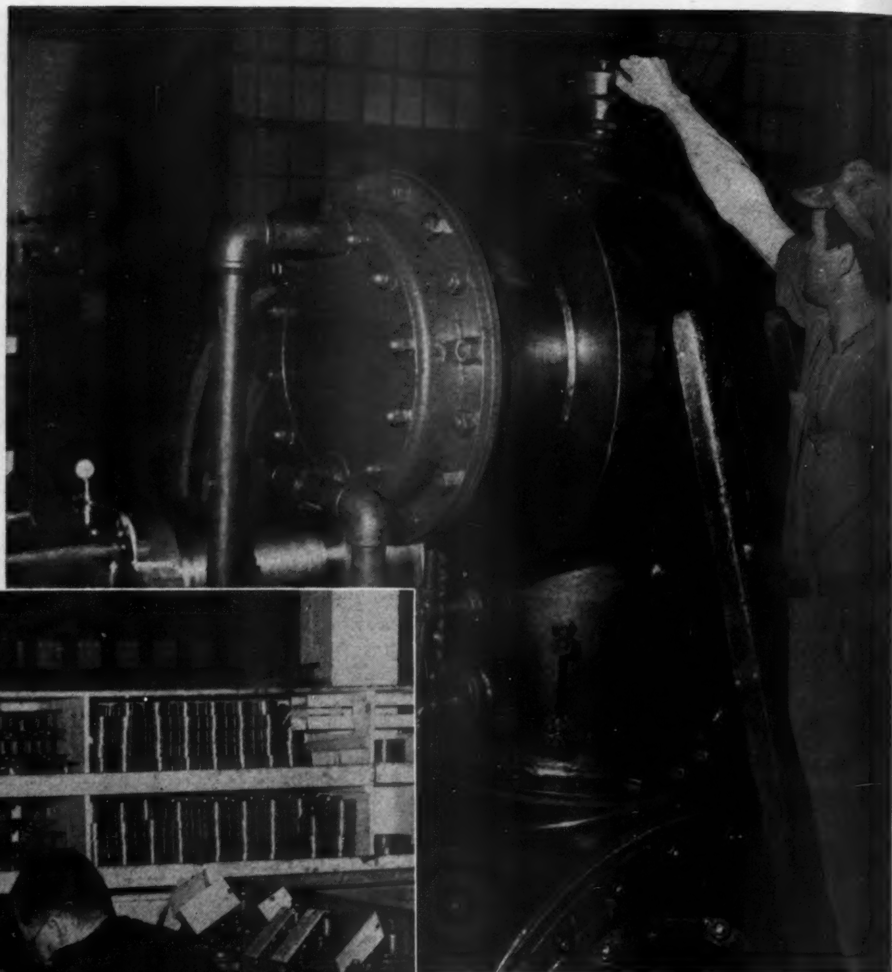
With a sun that blazes down out of a cloudless sky, drying fruit is simply a matter of letting nature take its course. Peaches, mostly of the free-stone variety, are usually halved or quartered, but not peeled. They are spread out thinly either on the roof of the house or any other convenient space where the sun can reach all sides. Apples are generally pared and cut into rings, which are strung on a line to dry. Only a few days are required to complete dehydration, not more than five or six at the most. Plums are dried whole and therefore need no preparation. They look something like a prune when finished. In the past few years, government agencies have been teaching Indian squaws to start fruit-drying in a hot oven to prevent weevils. But the ancient method that has served them well is still the most popular.

Back in an earlier day the Indians of the Southwest built mud storage compartments to hold their desiccated foods, and in those airtight rooms they could be kept for years. Large pottery jars also were and still are used for this purpose. But, as a general thing, their home dehydrating process is much less efficient than the modern methods employed by the gringo. Commercial drying plants extract all but about 3 per cent of the moisture, while sun-dried foods usually retain 25 per cent of their water content.

The Indian is doing his bit to preserve food that will help us win the war. Uncle Sam will not have to worry about feeding him while he is taking care of the rest of the world. In most pueblos there will be chili hanging on the walls this autumn, while granaries will be heaped with wheat for flour and corn for stock. Dehydrated food, including jerky, will be in storage for the winter. The southwestern Indian did not need a war to teach him how to dry food. Stern necessity of a bleak land did that for him back yonder when the West was young.

Wartime Compressor Maintenance

C. W. Gibbs



STATIONARY MACHINES

The illustration directly above shows an operator cleaning the intercooler of a 2-stage compressor with an air jet. For proper intercooling it is necessary that the air pass freely around the fins and through the cores of the intercooler. In the picture at the right, a man is checking an intercooler safety valve on a 2-stage compressor having a capacity of 4,453 cfm. Such valves should be operated manually each day as a safety measure.

MAINTENANCE is defined as "the act of keeping in a particular state." In the case of air compressors, the "particular state" can only be the state of complete readiness to produce compressed air. If the compressor stops, production is apt to cease. Maintenance is consequently vital.

In condensed form, the high lights of compressor care are: First, proper operation; and, second, prompt maintenance and repair. Both are preventive in character, aiming toward 100 per cent availability. Operation and maintenance should be the responsibility of one man or a group of men especially selected for the job. He or they should know the construction of their compressor or compressors thoroughly and should be familiar with the manufacturer's instructions. A file of the instruction books and parts lists for the units in a plant should always be on hand. A request to the builder will bring a new set if needed, but be sure when writing to specify the serial number of the machine.

The most frequent compressor troubles are directly traceable to faulty lubrication. Compressor oils, particularly those for the air cylinder, must be of the best. There are special grades of lubricants made for this purpose. They will probably cost more per gallon than the run of oils, but will certainly cost less per hour of compressor operation. Be stingy with the lubricant to be fed to the cylinders. Keep the valves and cylinder just greasy, not wet. Excess oil carbonizes and is the cause of many troubles. The use of a poor grade is positively dangerous: get only the best. On vertical or V-type units, where the cylinder is lubricated by splash from the crankcase, special oil should be used throughout. The oil level must be closely watched and kept between the limits set by the manufacturer. The lubricant should be changed every 300 to 500 hours, depending upon the service.

Intake air cleaners or filters definitely tend to reduce compressor wear and are recommended for all installations. Filters, however, must be cleaned at intervals if they are to do their work effectively. Maker's instructions should be followed.

The radiating fins of air-cooled machines have to be kept clean. This applies particularly to air-cooled intercoolers. They must be blown out periodically. The most common complaints with air-cooled units (overheating and valve trouble) are attributable directly to neglect of this phase of maintenance. Also be sure that air-cooled compressors are not placed near a wall, in a corner, or where they are cut off from air circulation.

With water-cooled machines use clean, nonscaling water, if possible. But where that cannot be done and scales form on jackets or cooler tubes, all the latter should be thoroughly cleaned at least once a year, or oftener if that is found to be necessary.

VALVE MAINTENANCE

Here are shown the parts of a portable-compressor valve that have been cleaned and are ready for reassembly. Valves of this kind have a very fine surface finish and must be handled with care to avoid damage. Each should be dealt with separately so that the same valve goes back on the same seat.

GOOD CARE PAYS DIVIDENDS

The operator shown here is pouring lubricating oil into the crankcase of a portable. This, as well as the engine crankcase, must be filled regularly, and each usually with a different grade of lubricant. Units of this type require more frequent oil changes than do stationary machines; but in all cases the manufacturer's instructions should be followed.

Valves are the most important part of a compressor. On their tightness and proper functioning depends the output and, to a large extent, the operating safety of the unit. First and foremost in valve care is regular inspection. That means removal of all valves, cleaning, replacement of broken or excessively worn parts, and proper reassembly. For best service, a valve assembly should be kept together; always put a valve back on the seat from which it was taken and in the same position. Check freedom of movement of each valve before returning it to the cylinder. Sometimes a spring gets cocked during assembly and limits valve action. Clean valves by soaking them in a solvent, taking care to blow off all the excess before restoring assemblies to the cylinder. Do as little scraping as possible.

Leaking valves can be spotted by the temperature of the valve covers, for under those conditions their temperature will be above "normal." The operator will soon get the "feel" of this and will be able to locate leaky valves quickly. Always replace such a valve at once.

Bearing adjustments should be made as infrequently as possible. More hot bearings result from too much adjustment rather than from not enough. Study the manufacturer's recommendations and instructions and carry them out to the letter.

Regulators usually require little attention. They should be tested every day, however, to make certain that they function. Dirt, lack of lubrication, and overzealous adjustment are the causes of most regulation difficulties. Follow the instruction book carefully.

Aftercoolers are installed in most plants to cool the air immediately after compression and to condense most of the water in the air. They must be kept clean. Furthermore, it is important that they be drained regularly and completely. Automatic traps are best suited for this purpose, but their operation must be checked at least once a week.

To summarize the foregoing:

1—Have someone responsible for maintenance.
2—Follow manufacturer's instructions.
3—Use the best oil sparingly and check the oil system frequently.
4—Keep the air filter clean.
5—Clean cooling systems regularly.
6—Inspect and clean valves systematically.
7—Adjust bearings only when necessary. Follow instructions.
8—Work regulator throughout full range every day.
9—Drain condensate from system continually.

Compressed Air Helps the Needleworker

Arthur Wolff

HOW THE WORK IS DONE

The operator sits comfortably at the worktable and moves the material back and forth in introducing the stationary needle into the pockets that make up the design. The padding cotton is forced into the spaces by compressed air, which is fed upward to and through the needle by way of a hose connection and the bracket shown at the left with the threaded needle in position. The air that feeds the cotton is turned on and off by a foot-control valve and is supplied at from 30 to 50 pounds pressure. The needle is a little less than 3 inches long overall, and is seen in detail in the drawing. Above is a fine example of trapunto work. The pillow is decorated with the British royal arms stitched in gold thread on gold-colored satin.

IN THE ART of decoration and fashion, no single factor is considered of more importance than the proper employment of ornamental textiles. Without curtains, draperies, or fabrics of some sort, a room loses its charm and life. Ordinarily, we are surrounded by textiles in one form or another; and whether they are for interior decoration or for our own clothing, they are designed to please the eye. Plain material is sometimes embellished with needlework such as crewel embroidery, quilting, or other fancywork, which adds measurably to its appeal and beauty.

Embroidery, which is usually defined as the art of needlework, is today a branch of industry that has many departments, each one calling for a different degree of skill. While hand embroidery can be done by any person who is willing to learn, it is not possible to teach any willing person how to operate the many different embroidery machines that are now available. In our modern time, embroidery, which means to embellish ornamentally or the

art of producing such work, may have no connection with needlework at all. The creator or designer must be well acquainted with the wide variety of effects that can be obtained with different mediums either by hand or machine and has to arrange his layout accordingly when designing a pattern. He also has to keep in contact with machinery builders and manufacturers of products in his line of business. Nailheads, to mention only one item, have been used for the last ten years as decorations for dresses, coats, hats, etc. This fad demanded special equipment and dies which would enable the operator to stud the material with the bits of metal along the lines of the ornamental pattern or border stamped upon it.

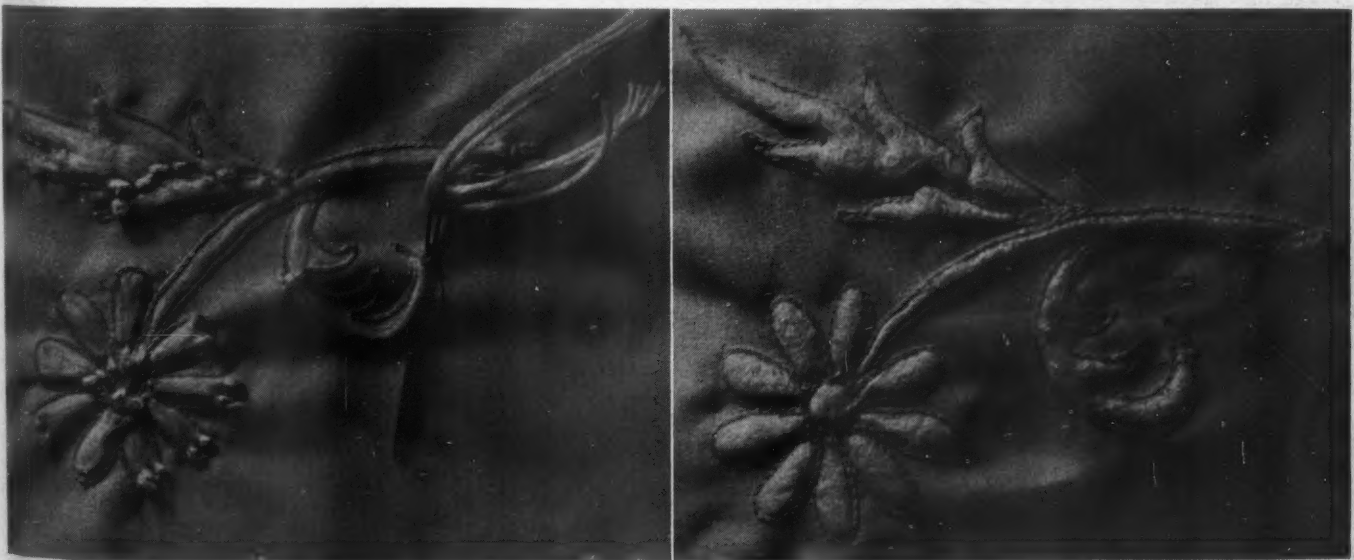
In this era of off with the old and on with the new—although the war is beginning to change our spendthrift habits—we are always looking for something different, and so what is modern one season is outmoded the next. This applies also to the art of embroidery, which includes quilting and padding. Formerly, padding was done exclusively and expensively by hand—by drawing one wool thread after another into spaces, formed by stitching a motif through several layers of material, until all were filled or puffed up, giving the effect of embossing. This work can now be performed in far less time and at less cost by compressed air, and the finished product cannot be distinguished from the most accurate handwork—in fact, it is not only more durable but also superior in appearance.

Today, padding is no longer a laborious process. It is done by machine and is called "trapunto work." In the *Dictionary of Decoration*, trapunto is defined as a type of quilting made of various decorative designs accented by extra padding or puffing. In order to obtain this beautiful effect, it is first necessary to place a lining, usually muslin, on the back of the material to be so embellished, and both layers are then stitched together along the contour of the design. The textile may be a brocade, damask, cretonne, etc., in which case the stitching follows the motif of the fabric itself. When selecting plain material such as velvet, satin, or taffeta, the design is first drawn on paper and all the lines are perforated. This can be used indefinitely as a stamping pattern. The motif is transferred on to the lining and stitched from that side, thus leaving the outer or ornamental fabric free from undesirable marks.

The stitching may be done either with a sewing machine or by means of a chain-stitch embroidery machine, and care must be taken to reproduce the design faithfully. As soon as this is completed, one can proceed with the trapunto work—puffing up with cotton thread all spaces or pockets between the stitching. This is done with compressed air. For quantity production, a compressor that supplies air at 30 to 50 pounds pressure and that is provided with a fractional motor and an air receiver is best suited for the purpose. For work that is done at home, a carbon-dioxide-gas outfit is more convenient because it can be stored away when not in service. The latter consists of an air gauge, a shutoff cock, and a length of rubber hose that is connected to the gas flask. In the large-scale operations, the air is taken from the shop's main line and fed through hose to small worktables upon each of which is mounted a bracket that holds a needle made of tubing. Upon the table, or underneath it on the floor, is set either an ordinary wooden spool of cotton or a cone-shaped spool that is now offered by the trade and that unravels easily. In the case of the first-mentioned spool it is necessary to place upon it a metal disk of a slightly larger diameter in order to prevent the thread from catching on the rim.

To thread the needle, the cotton is simply lead over a looped wire stand and then straight through the hollow needle from the back to the pointed end. When the air is released by pressure on a foot pedal, it flows up through an opening in the table and a passageway in the bracket to and through the needle, thus carrying the thread along with it. This goes on without interruption, for so long as the power is on, the air in the receiver is automatically maintained at the required pressure.

No experience is required to operate the pneumatic equipment or to do trapunto work. The material is held with both hands in the same plane as the needle, stamped side up, and is pressed against the point, thus pushing the latter into a pocket to be puffed up with cotton. When the space is filled and no more thread will enter, the foot is lifted to stop the flow of air; the needle is introduced elsewhere, the air is again released by depressing the treadle; and so on, until the entire design stands out in relief. It takes about one to two seconds to finish a pocket 1 square inch in size, depending upon the pressure used, and every corner is puffed up. The result is a beautifully smooth and rounded piece of work that is highly decorative and appropriate for embellishing dresses, coats, hats, pocketbooks, belts, pillows, and slippers made of all kinds of textiles, and even of leather.

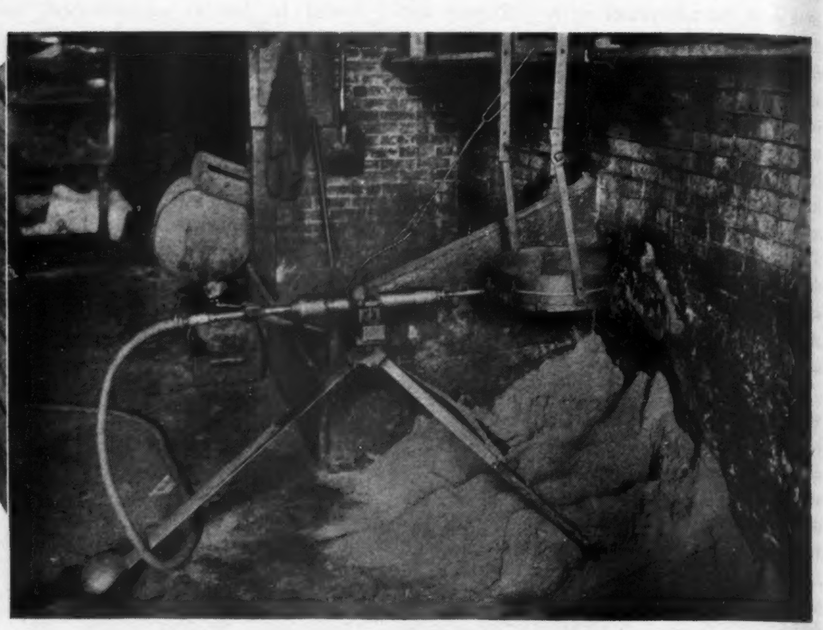


OLD AND MODERN METHOD

Here are shown the lining side of the same design executed by hand (left) and by machine (right). In the former case a conventional type of needle, threaded with several strands of wool, is painstakenly worked in and out to pad the pockets. This takes many stitches and leaves numerous loose ends of thread, necessitating the use of a double backing. By the modern procedure only one is required and compressed air blows cotton yarn into each space through a tubular needle. The finished product is nearly as smooth on the left as on the right side.

Saving Man-Hours with Compressed Air

R. N. Bryan



AIR TOOLS IN ODD SERVICES

Above is shown a conventional sand rammer that has been pressed into service to speed up the sifting of sand in a foundry. All that was required was to remove the tamping head and to attach the rammer to a sieve. Compressed air does the rest. The worker at the top, left, is operating a pneumatic drill fitted with a thin wire with which he is cleaning out the bit ends of hollow drill steel. Metal sheets that have a tendency to cling together are easily separated by vibration induced by an air-operated riveting hammer, as illustrated at the left.

OF LATE we have heard much about the shortage of manpower, a shortage that threatens to become more acute as the war continues. Each month, thousands of able-bodied young men are entering the armed services; and despite the fact that women have helped plug the gaps thus created, it is apparent that a serious situation has developed—a situation that has by no means reached its most critical stage. If the President's recommendations are followed we shall soon have 11,000,000 fighters in uniform, a total that will not include members of the Waacs, the Waves, and the other auxiliary organizations composed of women. Even to a country as large as ours this figure represents a terrific drain on industrial personnel.

Clearly, there is no panacea that will immediately eliminate the nationwide shortage of labor; but there are methods by which this shortage can be relieved, at least to a degree. It goes without saying that there would be no manpower shortage if one man could do the work that now requires two. Less obvious is the fact that in many industrial plants two or more men are now performing jobs that could be done by one man with the aid of proper facilities such, for instance, as compressed air. It is the purpose of this article to cite a few unusual applications of this motive power that are helping to conserve precious man-hours.

Existing pneumatic equipment can, in many cases, be used in ways that may never have occurred to a shop foreman or a plant owner. A little ingenuity in the application of air-operated tools and devices will often effect large savings in time, labor, and money—not to mention the increase in production thus made possible. Take, for example, one of our illustrations. It is of a pneumatic sifter that was devised by a foundry to obviate the need of purchasing expensive new equipment or employing hand labor and was made simply by removing the tamping head from an ordinary sand rammer, mounting it on a tripod, and attaching the end of the piston rod to a sifting screen. When compressed air is admitted, the reciprocal motion imparted to the tool is so rapid that it can scarcely be followed by the human eye and causes the screen to vibrate.

Another picture shows an unusual use of existing equipment. There the workman has before him a pile of flexible metal sheets which, because of their tendency to cling together, are difficult to separate by hand. Vibration set up by the hammering action of an air-operated riveting hammer easily breaks this hold so that the individual sheets can be lifted from the stack without trouble. The same general type of percussion tool can also be utilized to straighten deformed sheet-metal parts on cars, airplanes, or other kinds of machines. Or, equipped with a long chisel bar, it provides a means of scraping accumulated dirt and grease from factory floors, roofs, etc.

A widely different service performed by compressed air—one requiring merely the application of pressure—is that of transferring liquid from one container to another. We have a good example of this procedure in one of the accompanying illustrations. The air is furnished by an Ingersoll-Rand Type 30 compressor and flows to the tank car, forcing the liquid (in this case muriatic acid) through a hose to a concealed conduit and thence to the stationary tank in the foreground. Such a system is not only economical but also advantageous when handling costly or inflammable liquids. A similar application, familiar to some of us, is the transfer of beer through a system of pipes to the kegs.

Because of its expansive properties, compressed air is ideal for jobs that involve squeezing or pushing. Putting tops on barrels or drums, capping bottles, and many kindred operations might be cited in this connection. Work of this sort

primarily calls for the services of a cylinder in which a piston or plunger is moved up and down by compressed air. With the down stroke of the piston, the force is transmitted evenly to the drum or other receptacle that is being capped. This virtually eliminates the possibility of bending the top out of shape and thus making it unsuitable for use. Furthermore, a snug, leakproof fit is assured. Since a pressure device is basically simple and needs but little air, a compressor of small capacity is usually adequate. This is particularly true in industrial plants where work is conducted on a moderate scale.

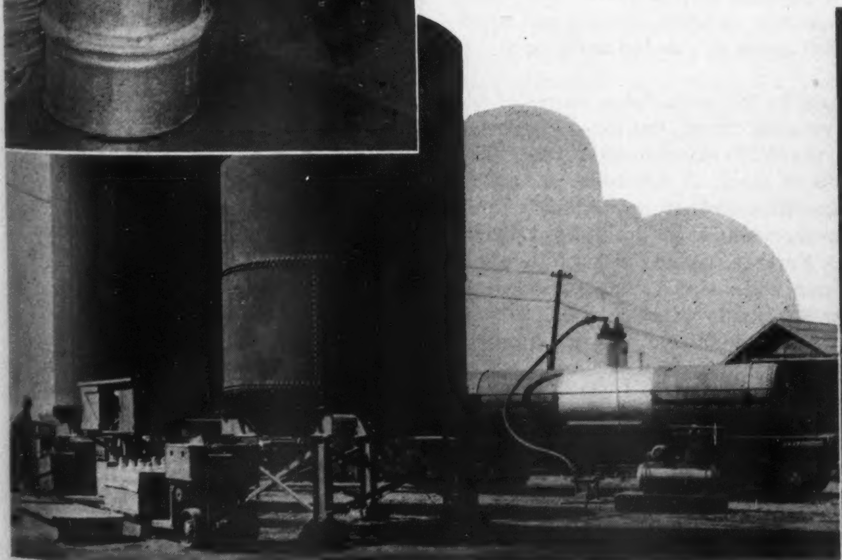
Compressed air can be used to advantage for testing automatic valves and other pressure-operated instruments, as well as for determining leaks in drums, tubes, pipes, and similar closed objects. The reader has undoubtedly observed garagemen test inner tubes for leaks. Exactly the same principle is applied in the case of drums. Those shown are filled with compressed air at a pressure of 20 pounds per square inch. They are then floated in water and rotated slowly. Air bubbles rising to the surface indicate punctures, loose seams, or otherwise faulty construction. Testing by this method eliminates the loss of costly materials through leakage or evaporation, and the spoilage of others that should not be exposed to atmosphere.

The foregoing operations by no means constitute an exhaustive list of the time- and labor-saving applications of compressed air, for they are limited only by the ingenuity of the user. We have made no attempt to describe the myriad "standard" applications, as these are too well known to warrant more than passing mention. A few of them may be properly included, and are given in the accompanying table.

Air Tools And Devices	Applications
Chipping hammer........................	Stone-cutting; cleaning mortar from old bricks; cutting tile conduits; removing old putty from window frames
Scaling tool............................	Scaling welds
Scaling tool equipped with scoop chisel.....	Cutting wooden patterns
Air jet.................................	Cleaning motors and other types of machinery; cleaning castings, tubes, heat exchangers; cleaning fabrics and upholstery
Air hoists (rotary and direct-lift)..........	Hoisting of all kinds
Grinder and surfacer.....................	Cleaning patterns; cutting grooves; smoothing soldered surfaces; smoothing concrete, etc.
Spray gun..............................	Painting
Sandblast...............................	Removing dirt, scale, rust, and other oxidization; etching designs on stone, wood, glass, etc.
Vibrator...............................	Testing resistance to vibration
Concrete vibrator........................	Vibrating poured concrete
Sand rammer...........................	Ramming sand in foundries
Pneumatic press.........................	Stamping and die-cutting; straightening rods and other deformed parts
Sump pump.............................	Dewatering

SOME USES OF AIR POWER

In the making of metal drums, compressed air is helpful in several ways. Those shown below are being tested for leakage by charging them with air at 20 pounds pressure. In the picture at the left a pneumatic cylinder is forcing drum heads firmly into place without distortion. The transfer of liquids, especially harmful acids, from small or large containers is safely and quickly effected without spillage with compressed air. At the bottom, left, is a tank car being emptied of muriatic acid with air supplied by the Type 30 compressor in the right foreground. The liquid is forced into one of the tanks at the left by way of an underground conduit.



Log of Our War Economy

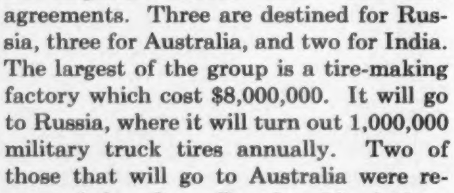
THE following paragraphs contain significant bits of information culled from official press releases sent out by the War Production Board.

FEBRUARY 27—Paper bags used by grocers, department stores, and many others are to be standardized and simplified. The number of bag sizes will be reduced from 284 to 117, and the basic weight of the paper will be cut about 5 per cent. These steps will save annually 80,000 tons of wood pulp and release 4,000 freight cars for other transportation. Bags made to order for a specific product such as coffee or peanuts are not affected. There are about 2,200 kinds of these special-purpose bags.

The supply of charcoal for civilian use such as steak-broiling will be greatly curtailed. The nation's charcoal production is around 405,000 tons annually, and approximately 375,000 tons is required for essential military and industrial purposes, for heating railroad cars, and for transporting fruits and vegetables.

MARCH 1—Eight industrial plants operating in this country have been acquired for shipment abroad under lend-lease agreements. Three are destined for Russia, three for Australia, and two for India. The largest of the group is a tire-making factory which cost $8,000,000. It will go to Russia, where it will turn out 1,000,000 military truck tires annually. Two of those that will go to Australia were requested by Gen. Douglas MacArthur. They will manufacture cans for the packing of food supplied by Australian growers for our soldiers.

MARCH 3—High officials of the War and Navy departments have declared that any change in the law establishing war time would seriously retard production of essential materials. It was claimed that enough electrical generating capacity was saved in 1942 by advancing the clock to produce 1,000,000,000 pounds of aluminum.



"Now I know why Jim used to say he was tired at night!"

The Container Coördinating Committee made public specifications for the proper packing of war materials for overseas shipment. Among other things, they specify how to provide adequate protection against corrosion for machine parts, assemblies, delicate instruments, etc.

The nation's average passenger car is now being driven at a rate of 5,400 miles a year, or only 400 miles more than the maximum set by the Baruch committee on rubber conservation. With continued public coöperation it is expected that the 5,000-mile goal will be reached this year.

MARCH 4—Car drivers were warned to check the antifreeze in their machines to be sure that it contains no harmful salt or distilled petroleum product. If a crystalline deposit is left after evaporating some of the fluid, or if the fluid floats on water, it falls in one of the foregoing categories and will injure the engine if allowed to remain in the radiator. The manufacture of such solutions is now prohibited, but some of them are still on the market.

MARCH 6—"Frozen" steel is now coming from many holders at the rate of 70,000 tons monthly. This is steel of all types that was intended for manufacturing automobiles, household equipment, and other peacetime items before factories shifted to war production. Last October more than 300,000 inquiry forms were sent to possible owners of such steel, requesting information on stocks held. A second form went to 100,000 persons or firms that reported having steel. It is indicated from the data gathered that there are seventeen varieties of steel and some 2,000,000 items in this hidden supply.

MARCH 7—By simplifying scores of articles ranging from hairpins to power trucks, the WPB saved in 1942 some 600,000 tons of steel, 17,000 tons of copper, large quantities of other materials, and enough man-hours to build 23 Liberty ships. Further, 82 other simplification orders are estimated to have conserved 180,000,000 yards of cloth, 30,000 tons of leather, 450,000,000 feet of lumber, 227,000 tons of pulp, 35,000 tons of solder, and 8,000 pounds of tungsten.

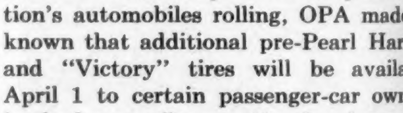
The Service Equipment Division announced that it is studying plans to assure continued operation of the country's hotels for the duration without curtailing essential services. No concrete program has yet been adopted, but among the suggestions put forth for discussion are: simplifying and standardizing menus, curtailment of porter and bellboy services, reduction of room service, and deëmphasizing large banquets and parties that have, in the past, placed a heavy load on kitchen and entertainment facilities and personnel.

MARCH 11—Mills that are rolling steel bars from old railroad rails are being permitted to exceed a schedule of 40 hours a week in order to provide more steel for manufacturers of farm equipment.

MARCH 15—A scientific "detective force" consisting of six dermatologists and one chemist has tracked down various causes of skin diseases and prevented further outbreaks in more than 50 Government and privately owned arsenals and war plants. The specialists are members of the Dermatosis Investigation Section of the U. S. Public Health Service. Before these doctor-detectives went to work, almost 15 per cent of the workers handling explosives in those plants suffered from some form of industrial dermatitis.

MARCH 17—In line with the Government's announced plans to keep the nation's automobiles rolling, OPA made it known that additional pre-Pearl Harbor and "Victory" tires will be available April 1 to certain passenger-car owners in the lower-mileage ration brackets.

Nonessential uses of certain specialty wrapping papers (specifically glassine, greaseproof and vegetable parchment) were prohibited by WPB. This will provide an estimated 10,000 to 15,000 tons a year for essential purposes, including the packaging of food, ordnance, drugs, and health supplies.



"Whut you goin' to do with your shoe-ration coupon, Zeb?"

Get Out the Scrap

DURING peacetime, scrap materials are almost a drug on the market. However, with America well into its second year of war, it is evident that steel production cannot be maintained at maximum capacity unless an adequate, steady flow of ferrous scrap is assured. Steel mills look to the nation's industries for the bulk of their requirements, for time is too short to create new channels of collection. The metal will have to be obtained through the existing sources of supply, namely, the mill, the foundry, and the broker, and, lastly, the small scrap dealer. These channels have been established over a period of many years.

Open-hearth furnaces produce more than 90 per cent of our steel. About half of the metal put into an open-hearth is scrap, and scrap represents in excess of 90 per cent of the materials that go into electric furnaces. An airplane engine is manufactured almost entirely of electric-furnace steel, and so are most of the key parts in a gun or tank. Steel can be made by any of these various processes by using pig iron and iron-ore charges with no scrap. However, it must be remembered that pig iron and iron ore in themselves are relatively impure substances. They contain an excess of silicon, phosphorus, and sulphur, which must be removed to a greater or lesser extent during the melting and refining operations. Regardless of the type of furnace, the refining process is as dependent upon time as it is upon temperature and the melter's skill. It is safe to say that if all the furnaces now operating on a normal scrap charge were forced to use pig iron and iron ore alone, our steel production would be cut in half.

For greatest efficiency, the furnace charges must be balanced so that when they are melted down the impure elements will be within fairly well-defined limits. Such charges can be obtained only by the use of scrap steel which has already been refined and has thus lost the greater part of the impurities which were originally present in the pig iron from which it was made. The refining period of any steel-producing unit can be cut appreciably by adding to the charge at least 60 per cent of steel scrap, for such a charge contains fewer impurities that require removal.

The consumption of iron and steel scrap by all classes of users in 1942 was estimated by the Institute of Scrap Iron & Steel, Inc., at 55,841,000 tons. Of this total, approximately 31,000,000 tons was recycled or plant scrap, and 24,800,000 tons was purchased or dealer scrap obtained by wrecking automobiles; industrial and railroad scrap; and scrap collected in salvage drives and from other sources.

The greatest tonnage of scrap melted down in the first World War was 26,800,000 tons in 1917. The present mechanized type of warfare requires a far larger and an ever-increasing pile. Every ship lost at sea, every tank destroyed, every plane shot down is so much scrap that cannot be utilized in the manufacture of new ships, tanks, and planes. Therefore, every source of industrial and other scrap must be scoured for every pound of metal. It is this dormant scrap that you make available that will keep the steel mills roaring at capacity. If you slow down or stop your efforts to find it and turn it in—if the mills have to do with one pile of scrap a day instead of two—then you must share the hazard of putting the boys in uniform on half rations of steel.

Why Not Try Reading?

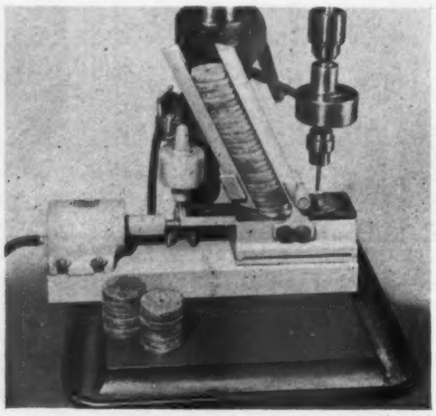
THE other evening, a friend of ours came in for a brief visit and dropped resignedly into an easy chair. It appeared that he hadn't much to do. In view of present conditions, he didn't like to use his car for pleasure driving. He couldn't find a bridge game. The nearest movie was more than a mile away, and he didn't want to ride the buses. "They're overcrowded already," he explained. Though patriotic, he was none too happy at the prospect of an idle evening. In short, he was seeking entertainment that would be compatible with wartime restrictions, and he had found none. The obvious solution had escaped him.

No doubt there are many thousands of others in the same mental boat as this gentleman. Has it never occurred to them to try reading for an evening? A number of years ago, Frederick Palmer, a well-known author, wrote a little gem of a piece for a fraternity publication. It started, "More than the weather had made it a shut-in day for me as a boy of twelve. I had a sprained ankle. When I tried to study, the pain grew worse. The pain ceased soon after I opened a book I found in the garret." The book was *The Three Musketeers*, by Dumas. This is but one of many early-day classics that would probably have dulled the boy's pain and that might ease the sense of boredom that afflicts so many people today. To list only a few of them—*The Count of Monte Christo*, by the same author; Dicken's *Pickwick Papers* and *David Copperfield*; Cervantes' *Don Quixote*; Hugo's *Les Miserables*; Sue's *Wandering Jew*; Irving's *Rip van Winkle*; Melville's *Moby Dick*; Dana's *Two Years Before the Mast*; Scott's *Ivanhoe*; Cooper's *Last of the Mohicans*; Harte's *The Luck of Roaring Camp*; Stevenson's *Treasure Island*; and those perennial favorites, *Tom Sawyer* and *Huckleberry Finn* by Mark Twain.

Perhaps you have heard it said that reading is a lost art. That is a common complaint among college professors, and possibly it is so, although the point is debatable. The huge circulations of our popular magazines would seem to give the lie to the assertion that the public has lost its taste for reading. Certainly, too, there are classics of the book world that have lost none of their appeal through the years. But it is regrettably true that a great many folks seldom think of reading as a primary source of entertainment. People like that are missing a lot of fun. And these days, what with the gas and tire rationing, fun isn't so plentiful.

Industrial Notes

Disc-Feeder is the name of a new semiautomatic fixture announced by the Mead Specialties Company for feeding, holding, and ejecting work in certain drilling and tapping operations. It is equipped with an adjustable hopper that enables it to handle



small stock of various shapes and sizes at the rate of 3,000 to 5,000 pieces per hour, depending upon the size. The fixture is operated by a foot-controlled pneumatic valve with air at from 80 to 125 pounds pressure. The model shown is suitable for drilling and tapping round, oval, square, or rectangular blanks, as well as a limited number of other shapes, and can be quickly adjusted to take stock ranging in diameter from about 1 to 3 inches (or 3 inches across the widest section) and in thickness from approximately 1/8 to 3/4 inch. Where more than one hole is to be drilled or tapped, several bushings may be mounted over the work. By substituting ordinary flat jaws for the hopper, the Disc-Feeder can be readily converted into an air-operated, hand-fed, drill-press vise.

Under the trade name of Fibre-Tex, Lacey-Webber Company is offering a floor-cleaning compound for use in garages, service stations, oil plants, airports, and industrial establishments where machinery is serviced or where oil or grease may collect or be spilled upon the floor. The material is highly absorbent, removes grease- and oil-caked dirt, and generally improves the appearance of floors, aside from greatly reducing the fire hazard. It is further claimed that Fibre-Tex does not burn even when the flame of a blowtorch is applied to it, or as the result of spontaneous combustion.

Why and how to conserve tires and other materials containing rubber is the theme of a sound motion picture, *Drive for Victory*, which the Goodyear Tire & Rubber Company is making available through its district offices and stores to clubs, schools, industrial gatherings, farm meetings, Government agencies, local-dealer shows, etc. The film covers the subject of rubber resources, both natural and synthetic, and gives simple hints that will help the motorist to get all the mileage possible from his present tires, which may be his last for several years. With a cast of professional actors, the picture has been produced with the average American home and automobilist in mind, and is entertaining as well as educational.

Tank linings for different requirements are being offered by Protective Coatings, Inc., under the trade name of Alkacite. Type AA is said to be highly resistant to acids and alkalies and suitable for coating metal surfaces that are not exposed to abrasion and where oils, greases, or solvents are not a factor. It is especially recommended for tanks faced with acid brick. The liquid is easily applied by brush or air spray and dries rapidly. Type HM-A1 is claimed to be better than rubber as a protection against caustics, oxidizing reagents, and powerful acids at high temperatures. These linings are seamless and vary from 1/4 to 3/4 inch in thickness. They are applied at the company's Detroit plant.

A new wrapping paper for protecting highly finished metal parts against corrosion has been announced by Sherman Paper Products. The material is known as V-26 and was developed by the company's packaging engineers working in coöperation with the armed services and war industries. It is a neutral kraft paper, colored red in accordance with Government specifications, and a 2-ply material that saves the trouble of multiple wrapping. The inner lamination is greaseproof and retains the corrosion preventives placed on metal surfaces, while the strong outer ply protects the greaseproof membrane against damage in transit. Both are noncorrosive and creped for flexibility. V-26 is available either with an outer film of wax or uncoated. Samples may be obtained from the Sherman Paper Products Corporation, Newton Upper Falls, Mass.

Heating rivets with coal- or natural-gas-fired furnaces inside ships' hulls is ruled out by the Marinship Corporation because of the inconveniences and risks involved. Instead, a "job-made device"—known as the Blackfield Coffeepot (it was designed by William Blackfield, assistant area planning engineer of the corporation)—is in use there and is found to fill the bill satisfactorily. Two types burning butane gas are in service: a portable for shipboard with a 5-gallon container adequate for an 8-hour shift, and a skid-mounted heater with a 50-gallon tank for yard duty. Both can be shifted about easily. Comparative records show that the butane-gas furnaces bring the rivets to a white heat in 45 seconds, or in about one-fourth the time required with coal. There is also a monetary saving involved, as coal for an 8-hour shift costs $1, as against 30 cents for butane.

In place of metal or creosoted-timber piling, which the war has ruled out because of a scarcity of material and equipment, U.S. Army engineers are using untreated wood piles instead for pier-building. They are protected by a coating of sand and cement that is shot against a wire-mesh reinforcing with air under pressure.

Dayton Rogers Manufacturing Company has prepared a 28-page service manual to give users of pneumatic die cushions the working knowledge that they should have to handle them efficiently. The book gives a detailed description, in simple language, of the construction, operation, care, and use of the two basic types—the bolster-plate and the press-bed mounting, together with installation instructions and some representative installations in connection with deep-drawing work, pressure-pad control on forming dies, and stripper-pad control on compound blanking and piercing dies. Anyone interested can obtain a copy of the manual by writing to the Dayton Rogers Manufacturing Company, 2835 Twelfth Avenue, South, Minneapolis, Minn.

Asbestos is pinch-hitting for critical metal that was formerly required for making airplane parts such as are shown in the accompanying illustration. The fibers are woven into a material called Asbeston,

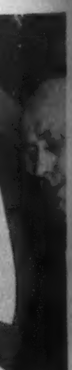
which is said to be considerably lighter than ordinary asbestos fabrics and to resist a continuous temperature as high as 350°F. and as low as –40°. The fittings can be joined to ducts or hose by cementing, by quick-grip couplings, or by bands clamped to sleeves inserted in them. They are made by the United States Rubber Company.

nds, or
ed with
saving
ft costs
e.

-timber
out be-
l equip-
ing un-
r-build-
nting of
gainst a
under

g Com-
service
atic die
hat they
iciently.
otion, in
ruction,
vo basic
e press-
tallation
tive in-
p-draw-
forming
on com-
s. Any-
y of the
n Rogers
Twelfth
nn.

r critical
for mak-
vn in the
ibers are
Asbeston,



ly lighter
s and to
e as high
he fittings
y cement-
by bands
em. They
es Rubber